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Participation Status in an Arkansas Better Chance Program on Early Literacy and Mathematics Readiness

Shanda R. Trotter-Coleman

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PARTICIPATION STATUS IN AN ARKANSAS BETTER CHANCE PROGRAM
ON EARLY LITERACY AND MATHEMATICS READINESS

by

Shanda R. Trotter-Coleman

Dissertation

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Dissertation



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ABSTRACT

by

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Title: Participation Status in an Arkansas Better Chance Program on Early Literacy and Mathematics Readiness (Under the direction of Dr. Wendy Ellis)

The current study explored the effects of ABC prekindergarten program status by gender and ethnicity on early literacy and mathematics readiness for students entering kindergarten in a large urban school district in Central Arkansas. The study used scores for kindergarten students categorized by their prekindergarten participation in the school district's ABC prekindergarten program (participated versus no participation), gender, and ethnicity (White and non-White). The NWEA MAP Growth assessment was used to measure literacy and mathematics achievement in all nine elementary schools in the Central Arkansas school district. In all four hypotheses, the main effect of ABC prekindergarten program participation was not significant. The second hypothesis revealed a significant main effect of gender on mathematics achievement with the females, on average, significantly outscoring the males. For the third hypothesis, the results indicated a significant main effect of ethnicity on literacy achievement. In this instance, the non-White students scored significantly lower on literacy compared to their White counterparts. Finally, for Hypothesis 4, there were two significant results in mathematics, the main effect of ethnicity and the interaction effect of ethnicity and ABC

prekindergarten program participation. Because the interaction effect helped explain the main effect of ethnicity, attention was given to the simple main effects analysis. The results of the simple effects analysis of the interaction indicated a significant difference between two of the pairings. First, the non-White students not participating in the ABC program scored significantly lower compared to the White students who did not participate in the ABC prekindergarten program. Second, the non-White students not participating in the ABC prekindergarten program scored significantly lower compared to the non-White students who participated in the ABC prekindergarten program.

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CHAPTER I

INTRODUCTION

The key to success is education. It is vital for participation in an ever-changing society. With easy access to technology and the internet, pupils are now competing not only with students in the United States but also students around the world. Students in the United States are trailing behind those in countries such as Canada, China, Finland, Hong Kong, Singapore, and South Korea—countries becoming global leaders in education (Sung-Jun, 2010). The United States has to get serious about investing in education. It is critical to the success of America that teachers provide an adequate education for students ages four and older.

The state of Arkansas has diligently worked to provide rigorous educational standards for their students. *Arkansas News* reported that Arkansas was previously ranked fifth in the nation (for 2 years in a row) in its annual ranking of states' educational policies and performance (Lyon, 2013). An achievement such as this in the education of Arkansas children is tremendous and shows Arkansans are trending up and attempting to meet the diverse needs in today's ever-changing technological world to ensure that the children in Arkansas receive the quality education they deserve.

People's interest and attention gained momentum with the *No Child Left Behind Act* in 2002. The legislators used the Act to emphasize increasing accountability and proficiency of students by focusing on high-stakes tests and student achievement. The

passage of the Act signaled the importance of addressing students' different abilities as they enter kindergarten. Burchinal et al. (2008) argued that the means to bridge the gap and decrease the variability in capacities lies in offering quality, developmentally appropriate, universal prekindergarten education that provides instruction for 3- and 4-year-olds. Prekindergarten has been shown in research to increase students' achievement of skills in academics, social competencies, and language (Barnett, Cook, Jung, & Wong, 2008; Burchinal et al., 2008; Mashburn et al., 2008). A deliberation continues to exist about the characteristics that make prekindergarten effective. Also, educators continue to debate the setting in which it should take place (Burchinal et al., 2008; Mashburn et al., 2008). Vandell's (2004) research suggested that offering high-quality prekindergarten would result in a more significant percentage of the general population being *ready to learn* at the beginning of their school career.

The *No Child Left Behind Act* created a positive step forward for the children of the nation. Notably, it magnified the differences between where students were making progress versus where they needed additional support, regardless of zip code, income, home language, ethnicity, background, or disability. The National Committee for Economic Development encouraged high-quality, universal prekindergarten for more than the academic gains it would help provide (Morrisey & Warner, 2007). In 2002 and again in 2004, this committee emphasized high-quality, comprehensive prekindergarten for economic prosperity. It has been, however, over a decade since *Goals 2000* was introduced, and children from higher-income families are still more likely to be enrolled in prominent prekindergarten programs than those from economically disadvantaged homes (Magnuson, Meyers, Rahm, & Waldfogel, 2004).

Mandates of the *No Child Left Behind Act* became increasingly unworkable for schools and educators, and revisions needed to be made. The Obama administration presented a new plan in 2010. They joined an initiative from families and educators to create a law that focused on the explicit goal of sufficiently preparing all students for success in careers and college. President Obama signed the *Every Student Succeeds Act* on December 10, 2010. The new law builds on critical areas of progress made possible by the efforts of students, parents, communities, and educators across the United States. President Barack Obama proposed making high-quality preschool available to every child in the United States. He wanted to ensure that no child started the educational process already behind (U.S. Department of Education, 2013). Obama contended that the foundation of education must begin with rich early learning experiences in a prekindergarten setting to build the groundwork for success.

Prekindergarten has been shown to have various benefits in the areas of academic skills, social competencies, and language (Burchinal et al., 2008; Mashburn & Pianta, 2006; Mashburn et al., 2008; Wong, Cook, Barnett, & Jung, 2008). One means to provide children with the resources needed to be successful in future years is cognitive stimulation before entering a prescribed kindergarten program (Janus & Duku, 2007). The government sets guidelines to determine which income bracket qualifies families for public prekindergarten. Federally supported programs might not offer rich experiences that private prekindergarten and state-supported programs offer (Magnuson, Ruhm, Waldfogel, 2007).

Many families may not earn enough to pay for high-quality prekindergarten but have too high of an income to qualify for primary childcare. This income dilemma leaves

many children deprived of rich educational experiences before they enter kindergarten. Funds for public schools are slowly increasing through state funding for public prekindergarten. However, this funding is limited by the economy and other general needs (Barnett et al., 2008). States that choose to finance public prekindergarten programs do not often distribute adequate funds to programs to provide high-quality education for every child who wishes to attend. Many children may be considered behind before they even begin school due to limited accessibility combined with the demands and expectations placed on school administrators for achievement.

In the United States, public prekindergarten education is similar to K-12 education. The funding sources involve a combination of several resources including federal, state, and local funds (Barnett & Robin, 2006). A guarantee of education, high-quality or otherwise, is not given to all children meeting the age requirement for prekindergarten. Many children lack prekindergarten experiences in any form, and others do not attend programs of quality due to lack of access. Research exists on high-quality, state-funded, prekindergarten in states including Oklahoma, North Carolina, and Georgia (Barnett et al., 2008; Early et al., 2007; Gormley, Dawson, Gayer, & Phillips, 2005).

The foundation of the current study relied heavily on research that demonstrated prekindergarten to be effective in improving skills in social competencies, language, and academics (Burchinal et al., 2008; Mashburn & Pianta, 2006; Mashburn et al., 2008). There continues to be a debate, despite the existing research, about the characteristics that make prekindergarten efficient. The debate also focuses on the setting in which prekindergarten should take place (Barnett et al., 2008; Burchinal et al., 2008; Gormley et al., 2005; Mashburn & Pianta, 2006; Mashburn et al., 2008).

This study's purpose was to evaluate the development of prekindergarten students on mathematics and early literacy skills, depending on their participation in a public ABC prekindergarten program. Scores from public school prekindergarten students from a Central Arkansas school district were involved in this study. Archived data were analyzed as part of this study. The students' scores were divided into whether the students participated in the school district's Arkansas Better Chance (ABC) prekindergarten program or they did not participate in the district's public prekindergarten program. They were also subdivided by gender and ethnicity. The kindergarten early literacy and mathematics scores of the cohort of students were examined to analyze differences between the groups on early mathematics and literacy achievement measured by the Northwest Evaluation Association Measures of Academic Progress exam (NWEA MAP Growth assessment).

Statement of the Problem

The purpose of this study is articulated in four statements. The purpose of this study encompassed the following objectives:

1. To determine the effects by gender between participation in the ABC Prekindergarten Program versus no participation in the program on the literacy achievement measured by the NWEA MAP Growth assessment for students entering kindergarten in a large urban school district in Central Arkansas.
2. To determine the effects by gender between participation in the ABC Prekindergarten Program versus no participation in the program on the mathematics achievement measured by the NWEA MAP Growth assessment

for students entering kindergarten in a large urban school district in Central Arkansas.

3. To determine the effects by ethnicity between participation in the ABC Prekindergarten Program versus no participation in the program on the literacy achievement measured by the NWEA MAP Growth assessment for students entering kindergarten in a large urban school district in Central Arkansas.
4. To determine the effects by ethnicity between participation in the ABC Prekindergarten Program versus no participation in the program on the mathematics achievement measured by the NWEA MAP Growth assessment for students entering kindergarten in a large urban school district in Central Arkansas.

Background

During the first part of the 1960s, early childhood education was not deemed necessary. At that time, only 10% of 3- and 4-year-olds in the United States were enrolled in a prekindergarten program (Barnett et al., 2008). President Lyndon B. Johnson initiated the Head Start Program in January of 1964 as part of the *war on poverty*. Then, Congress passed the Economic Opportunity Act in July of 1964. With this Act, the Head Start Program was originated (Foster, n.d.). Select children who planned to enter public school in the fall of 1965 attended an 8-week summer assistance program for children in low-income families. This program was the first Head Start program and serviced more than 560,000 children in those prekindergarten classes (Foster, n.d.). In 1966, Congress authorized a fully funded, year-round Head Start program.

Foster (n.d.) referenced that in 1973, a home-based program was added. Further, in 1995, the Early Head Start program was added, allowing services to children of low-income families from birth to age 3. Both full-day and year-round services were added to the Head Start program when it was reauthorized in 1998. President George W. Bush updated the reauthorization in 2007 to include services for homeless children. Later, the Obama administration invested \$2.1 billion in Head Start and Early Head Start through the American Recovery and Reinvestment Act. Birch (2011) observed that the investment allowed the program to expand to reach an additional 61,000 families.

Prekindergarten programs that are publicly funded are not required or supported by the federal government; instead, funds are provided by school districts that offer prekindergarten education for up to 2 years (Magnuson & Waldfogel, 2005). Of the nation's 4-year-olds, 30% or less are enrolled in state-funded prekindergarten programs (Barnett, Carolan, Fitzgerald, & Squires, 2011). In the early 1950s, two Little Rock, Arkansas women—Maggie Reynolds and Gay Gattis—saw the need to bring people who were concerned with the welfare and education of prekindergarten students together (Arkansas Early Childhood Association, 2013). The Arkansas Association on Children under Six was created out of their concern. This organization worked diligently to get Amendment 53 passed, removing the constitutional barrier of age restrictions for public school education in Arkansas (Arkansas Early Childhood Association, 2013). Since that time, many changes have taken place in Arkansas' education of the early childhood learner. In 1991, a considerable change occurred with the implementation of the ABC program. The focus of the ABC prekindergarten program was to offer high-quality early-

education services to children birth to 5 years old who exhibited developmental and socioeconomic risk factors.

The ABC program grant funds the prekindergarten program in the Central Arkansas school district in this study. The school district received an ABC grant in 1991 to open the first district prekindergarten classroom at a local elementary school, which served 36 students (i.e. 3- and 4-year-olds). The school district has 31 prekindergarten classrooms serving 624 children who are 3- and 4-years-old and 2 infant/toddler classrooms serving 16 children who are 0 to 3-years-old whose parent(s) is a student in the school district. Data from the NWEA were used to make an early determination of placement in kindergarten classrooms.

In Arkansas, all public school prekindergarten teachers must hold a standard Arkansas teacher license (Arkansas Department of Education, 2012). In addition to teaching proficiency, professional development is mandated for public prekindergarten teachers focused on training in the following:

- Arkansas Framework for Infant and Toddler Care,
- Math and Science for Young Children,
- Prekindergarten Early Literacy Learning in Arkansas,
- Prekindergarten Social-Emotional Learning,
- Child Outcome Planning and Assessment,
- Work Sampling Online,
- Individuals with Disabilities Education Act, and
- Special Education Rules and Regulations.

The teacher must be able to demonstrate competency in the areas of daily classroom management, curriculum development, and developmentally appropriate programming.

The needs of the early childhood learner are determined through vital assessments (Arkansas Department of Education, 2013). Teachers assess children in the school district's prekindergarten program annually. Results from these assessments indicate progress towards school readiness. Getting prekindergarten students ready for kindergarten is an essential component for these programs. These assessments identify each child's progress and strengths so needs and weaker areas can be addressed. The annual screening or assessment allows teachers to determine the child's individual needs as well as any educational deficiencies or developmental delays (Arkansas Department of Education, 2012). The screening includes areas of developmental milestones, social skills, fine and gross motor skills, language and speech development, visual-motor skills, and vocabulary. The child also receives a vision and hearing screening. Any child identified with educational deficiencies or developmental delays will be referred to the school district's special education program. In addition, teachers in the study's ABC prekindergarten program are required to have written curriculum plans. The program curriculum must be arranged in topics of study, projects, thematic units, and include objectives and goals that relate to language, physical development, cognitive/intellectual learning, creative/aesthetic learning, social/emotional development, and cultural diversity.

Early Childhood Education Long-Term Effects

There have been numerous studies exploring the long-term effects of prekindergarten education according to Barnett et al. (2008). Studies of public

prekindergarten education have confirmed findings that have lasting and significant effects on social behavior, school progress (high school graduation, special education placement, and grade repetition), and cognitive abilities. The estimated effects decline, however, as students progress to adulthood. In September of 1962, Weikart (1970) initiated the Ypsilanti Perry Preschool Project, a longitudinal study that focused on understanding the impact of early childhood education on shaping young learners' lives. The study involved 123 disadvantaged minority children. One group of students received no preschool services, and another group of students was randomly assigned to a half-day preschool program. Students in this study attended the preschool program for 2 years with the majority of them beginning at age 3. The effect on students' general cognitive abilities and language after 2 years was significant. There were about 0.90 standard deviations between the two groups.

This study was conducted to gain insight on whether differences existed between students who participated in a Central Arkansas school district's ABC prekindergarten program and those not participating in the program on literacy and mathematics. Gender and ethnicity were also used as independent variables to determine whether interaction effects existed relating to ABC participation. All students need to receive a solid foundation in elementary school to prepare them for further academic and career success. This research provides a snapshot for determining whether, in this study, ABC participation helps to prepare students for academic achievement differently compared to not participating in the ABC prekindergarten program.

Hypotheses

I formed the following hypotheses based on the literature review.

1. No significant difference will exist by gender between participation in the ABC Prekindergarten Program versus no participation in the program on the literacy achievement measured by the NWEA MAP Growth assessment for students entering kindergarten in a large urban school district in Central Arkansas.
2. No significant difference will exist by gender between participation in the ABC Prekindergarten Program versus no participation in the program on the mathematics achievement measured by the NWEA MAP Growth assessment for students entering kindergarten in a large urban school district in Central Arkansas.
3. No significant difference will exist by ethnicity between participation in the ABC Prekindergarten Program versus no participation in the program on the literacy achievement measured by the NWEA MAP Growth assessment for students entering kindergarten in a large urban school district in Central Arkansas.
4. No significant difference will exist by ethnicity between participation in the ABC Prekindergarten Program versus no participation in the program on the mathematics achievement measured by the NWEA MAP Growth assessment for students entering kindergarten in a large urban school district in Central Arkansas.

Description of Terms

Arkansas Better Chance Program (ABC). The ABC program was created in 1991 by the Arkansas General Assembly. It offers high-quality preschool education for children from birth to 5 years of age exhibiting socioeconomic and developmental risk factors (Arkansas Division of Childcare and Early Childhood Education, 2011). ABC is also a funding source for early intervention programs that serve educationally deprived children (Families & Children Together, 2013).

Division of Child Care and Early Child Care and Early Education. The Division of Child Care and Early Child Care and Early Education was established in Arkansas by Act 1132 of 1997. Its purpose was to enhance the coordination of early childhood education programs and child care within the state (Arkansas Department of Human Services, 2011).

Economically Disadvantaged. The economically disadvantaged designation is a status indicating students who are eligible for free or reduced-price meals under the National School Lunch and Child Nutrition Program based on annual family income at or below the official federal poverty line (Newton, 2013).

Head Start Program. The Head Start Program is a federally funded program that targets 3- to 5-year-old children and provides medical services, nutrition, and education to preschoolers (Rock, 2013).

Northwest Evaluation Association (NWEA). The NWEA is a not-for-profit research-based organization that supports educators and students internationally by creating assessments that individually measure proficiency and growth. Teachers can use

the results of these assessments to help guide instruction in the classroom (NWEA, 2013).

Prekindergarten. Prekindergarten is a term that is used to define a preschool that provides educational experiences for children ages 3-4 (Barbarin et al., 2008).

Preschool. Preschool is the term used to describe a center-based program that provides educational experiences for children during the year or years preceding kindergarten (Esponosa, 2002).

School Readiness. School readiness refers to the level of competency required to adequately prepare students for kindergarten (Chien, Halle, Hair, & Wadner, 2012).

Significance

Research Gaps

Debates, in part, about the quality of prekindergarten prompted this study. Prekindergarten effectiveness research drives governmental and organizational agencies to mandate the improvement of quality programs, and as a result, increase student achievement (Barnett, Hustedt, Robin, & Schulman, 2003; Early Childhood Knowledge and Learning Center, 2007). The nation's expectations for complying with prekindergarten quality standards, along with children's preparedness for kindergarten, continue to rise (Chien et al., 2012). A focus on the significance of early literacy development and the cognitive skills required for future academic achievement has begun through policy and research (Fram, Kim, & Sinha, 2012; Huang, Invernizzi, & Drake, 2012; Kuaerz, 2002). The essential skills that encourage the active development needed for school readiness are provided by prekindergarten programs (Barnett et al., 2008;

Barnett & Hustedt, 2005; Gormley et al., 2005; Magnuson et al., 2007; Nores, Belfield, Barnett, & Schweinhart, 2005).

A discussion about the exact effect of prekindergarten on school readiness continues to be debated (Barbarian et al., 2008; Barnett & Camilli, 2002). Various studies have determined that participation in a prekindergarten program leads to heightened early childhood development and kindergarten readiness in 4-year-olds (Magnuson et al., 2004; Magnuson et al., 2007). Some studies have examined the long-term impact of prekindergarten participation on later student academic achievement, the economy, citizen productivity, and future student success (Barnett, 1995; Gormley et al., 2005; Legal Momentum & the MIT Workplace, 2005; Nores et al., 2005; Shonkoff & Phillips, 2002). High-quality prekindergarten programs afford early childhood learners the opportunity for school readiness, but additional research is needed to identify achievement gaps in literacy and mathematics of students who have and have not attended a prekindergarten program. The ultimate goal of these types of studies is to reinforce the need for proper preparation in allowing all students to be successful in school.

Possible Implications for Practice

The level of academic quality offered to students by a specific public school was examined in the study. The purpose of this study was to determine whether students who attended a Central Arkansas school district's ABC prekindergarten program performed at a significantly different level of achievement in the areas of literacy and mathematics by ethnicity and gender compared to students who did not attend the school district's ABC prekindergarten program. The results of this research may help administrators and

teachers determine the interventions needed for students who completed the district's ABC prekindergarten program and those who did not. Information from this study and the evaluation of student early mathematics and literacy data will guide teacher educators, policymakers, higher-education instructors, and practitioners in improving quality prekindergarten programs in public schools.

Process to Accomplish

Design

A quantitative, causal-comparative strategy was used in this study. In the first and second hypotheses, two 2 x 2 factorial between-groups designs were used. The independent variables for these two hypotheses were gender (male versus female) and participation in the school district's ABC prekindergarten program (participated versus no participation). The dependent variables were literacy and mathematics achievement measured by the NWEA assessment for the beginning of the year kindergarten students, respectively. In the third and fourth hypotheses, two 2 x 2 factorial between-groups designs were used. The independent variables were ethnicity (White versus non-White) and participation in the school district's ABC prekindergarten program (participated versus no participation). The dependent variables were literacy and mathematics achievement measured by the NWEA assessment for the beginning of the year kindergarten students, respectively.

Sample

The study used scores for kindergarten students, categorized by their prekindergarten participation in the school district's ABC Prekindergarten Program (participated versus no participation), gender, and ethnicity (White and non-White) by the

Arkansas Public School Computer Network, who took the NWEA assessment in all nine elementary schools in the Central Arkansas school district. Both scores from male and female students and White and non-White students were included equally in the sample.

Instrumentation

In the fall of 2016, kindergarten students were tested on the NWEA MAP Growth assessment in both literacy and mathematics. The kindergarten assessment measures student literacy and mathematics skills and also informs educators of what the students are ready to learn. MAP Growth creates an assessment experience that is personalized to measure performance accurately—whether a student performs below, on, or above grade level (NWEA, 2013). NWEA reported scores for MAP administrations as a total Rasch UnIT or RIT score, which relates the test score to the curriculum. The RIT score is then disaggregated by content goals, four for mathematics (i.e. Operations & Algebraic Thinking, Real & Complex Number Systems, Geometry, Statistics & Probability) and three for reading (Literature, Informational Text, Foundational Skills & Vocabulary).

Data Analysis

To address the first hypothesis, a 2 x 2 factorial analysis of variance (ANOVA) was conducted using participation in the school district's ABC prekindergarten program (participated versus no participation), as identified by APSCN, and gender as the independent variables, and the overall literacy achievement as measured by the NWEA MAP Growth assessment as the dependent variable. The second hypothesis was analyzed by a 2 x 2 factorial ANOVA was conducted using participation in the school district's ABC prekindergarten program (participated versus no participation), as identified by APSCN, and gender as the independent variables, and the overall mathematics

achievement as measured by the NWEA MAP Growth assessment as the dependent variable. Hypothesis 3 was examined a 2 x 2 factorial ANOVA was conducted using participation in the school district's ABC prekindergarten program (participated versus no participation), as identified by APSCN, and ethnicity as the independent variables, and the overall literacy achievement as measured by the NWEA MAP Growth assessment as the dependent variable. I conducted a 2 x 2 factorial ANOVA to test the fourth hypothesis using participation in the school district's ABC prekindergarten program (participated versus no participation), as identified by APSCN, and ethnicity as the independent variables, and the overall mathematics achievement as measured by the NWEA MAP Growth assessment as the dependent variable.

CHAPTER II

REVIEW OF LITERATURE

The opportunity for all children to have access to a quality prekindergarten program has been the explicit focus of specific current research. Early childhood education provides a foundation that potentially helps children succeed academically in life. The influence of early educational experiences is also a primary focus as it concerns the future academic success of children. Studies continue to reflect the effect that prekindergarten has on early childhood development. The objective of this chapter was to explore the foundation and influence of a well-designed prekindergarten system. Philosophies that examined the effect of prekindergarten on school readiness in the development of cognitive and early mathematics and literacy skill were highlighted in this chapter. This chapter also includes contextual information on the role of the government in providing early childhood services to children and families in the United States.

Evolution of Early Childhood Education

The terms *prekindergarten* and *preschool* are often interchanged. Both are defined as educational experiences involving quality instruction and activities that advance competencies and skills essential for kindergarten success (Burchinal et al., 2008; Cohen, 1996; Mitchell, Seligson, & Marx, 2001). The early childhood experience begins at birth and continues until the child is kindergarten enrollment age. Early

childhood education dates back to the 1820s (Andrews & Slate, 2001; Bainbridge, Meyers, Tanaka, & Waldfogel, 2005). In the 1820s, the Boston Infants' School opened with two purposes: to provide an alternative to at-home childcare and to assist working mothers by providing childcare for children ages 18 months to 4 years (Andrew & Slate, 2001). As more immigrants moved to the United States, the need for childcare continued to grow. In 1854, New York day nurseries began to emerge (Mitchell et al., 2001). Childcare for children ages 6 weeks to 6 years was provided to poor women. Parenting resources were also provided (Andrew & Slate, 2001). For this discussion, prekindergarten was defined as children ages 3 and 4 who receive early childhood services.

The increase in prekindergarten enrollment in the 1900s can be attributed to several noteworthy occurrences in the history of the United States (Robertozzi, 2011). First, in the 1900s, there was an increase in women joining the workforce (Barnett et al., 2003; Cohen, 1996). Second, government mandates based on research about the positive benefits of prekindergarten programs caused increases in such programs (Barnett et al., 2003). Third, funding was provided by more government initiatives for prekindergarten, including President Lyndon Johnson's War on Poverty in 1965 (Barnett & Hustedt, 2005; Barnett et al., 2003; Manguson & Waldfogel, 2005).

Early childhood education and its relationship to school readiness have been the center of much debate (Lundberg, 1998; McCormick & Mason, 1984; National Institute of Child Health and Human Development, 2000; Welch & White, 1999; Wong et al., 2008). However, there has been no significant discussion on the importance of being able to understand the underlying mathematics skills and being ready to read. What is

essential is whether or not children should develop critical early literacy and mathematics skills before they enter formal kindergarten (Masseti, 2009; Molfese et al., 2006; Whitehurst & Lonigan, 1998). Whitehurst and Lonigan (1998) noted that reliable predictors of future achievement in mathematics and reading occur during a child's preschool-age development.

The *Reading First Act* and the *No Child Left Behind Act* were federal responses to concerns about the educational achievement of all children (Molfese et al., 2006). Molfese et al. (2006) emphasized focusing on the preschool ages to improve academic achievement, particularly in the area of reading. Nationwide, states spent more than \$5 billion on preschool education in the 2008-2009 school year (Barnett et al., 2008). While this seems significant, the extent of services is often limited.

Prekindergarten Programming Initiative Evolution of Government

Early childhood education, supported historically by legislative initiatives, has led to the attempt to aid a variety of economic and social issues such as mothers going to work to assist their families (Barnett & Hudstedt, 2005; Cohen, 1996; Magnuson & Waldfogel, 2005). These legislative initiatives, whether private, federal, state, or local funds, have provided financial backing for some of the prekindergarten programs (Barnett et al., 2008). The kind of funding ultimately determines the quality and type of the program. Children from at-risk or disadvantaged situations are often targeted for federally-funded prekindergarten programs (Andrews & Slate, 2001), which is often referred to as Head Start programs. Under the direction of President Lyndon Johnson's administration, Head Start programs began in the summer of 1965 (Zigler & Styfco, 1994; 2000). Although privately-funded programs, in contrast to their federally-funded

counterparts, typically enroll Caucasian children from high-income backgrounds (Andrews & Slate, 2001), other federal funds and Head Start programs are used to focus on closing the gap in the education of disadvantaged children. Historically, private programs have focused on socialization and educational enrichment. Although Head Start was intended as an inclusive service for children from at-risk homes, the federal government has never entirely funded the program to make it accessible to all who met the qualifications (Witte & Trowbridge, 2005).

The *Title I Elementary and Secondary Education Act* provides federal funds to schools serving disadvantaged and at-risk children (Gayl, Young, & Patterson, 2010). The number of students in a school qualifying for free and reduced lunches determines the funding level (Matthews & Ewen, 2010). Title I allows schools to use funds for prekindergarten if the school is serving children who would typically attend that school upon reaching the mandated age for attendance. Funds may also be used when the program focuses on raising the academic achievement of children once they enter school (Matthews & Ewen, 2010). Districts have not traditionally used this significant source of funds for early education, but with increased accountability, some districts are choosing to use Title I monies to fund prekindergartens as a strategy to ensure children are equipped to enter kindergarten and have the experience to meet academic standards in the future (Gayl et al., 2010). When implementing a Title I prekindergarten, a school system must follow the Head Start Guidelines in Section 641A (a) to use this funding source for early education (Matthews & Even, 2010). The guidelines deal with standards related to school readiness such as health services, scientifically-based curriculum, nutrition services, the transition to formal school, and parent involvement (Head Start Act 641A

[a]). The guidelines also emphasize mathematics development, the development of social and emotional awareness, science, creative arts, and physical dimensions as well as the development of literacy and language such as phonemic awareness, print awareness, and alphabetic knowledge. In 2002, the Department of Education estimated that 2-3% of districts were using Title I funds for these programs. Presently, there is not sufficient data to determine how many school districts are using Title I funds (Gayl et al., 2010).

Public-school prekindergarten is funded through federal, state, or local funds and encountered a significant expansion in the 1990s (Witte & Trowbridge, 2005). In both public and private preschools, enrollment has substantially increased over the last decade. Currently, almost 30% of 4-year-olds attend a state-funded prekindergarten program. The number increases to 42% when early childhood special education and Head Start are included (Barnett et al., 2008). With the addition of private-program enrollment for 4-year-olds, the number increases to 74%. In 1979, seven states offered public prekindergarten (Mitchell, 1989); the number grew to 10 states in 1980 (Morrisey & Warner, 2007). In 2009, 40 states subsidized prekindergarten (Barnett et al., 2011). Now, all 50 states offer Head Start and private prekindergarten programs. Witte and Trowbridge (2005) stated that 45% of 3- to 5-year-olds from low-income families are enrolled in a program, compared to 75% of 3- to 5-year-olds from high-income homes.

More than \$5.49 billion was spent on prekindergarten in 2010 (Barnett et al., 2011). State funding for prekindergarten has decreased while the federal government continues to provide some funding to support the program. State funding decreased by \$30 million in 2009 and by almost \$60 million in 2010. A record drop in state funding occurred in back-to-back years in the 2011-2012 school year. Funds provided by the state

decreased by half a billion dollars (Barnett, Carolan, Fitzgerald, & Squires, 2012). Yet, in that year, over 600,000 more children enrolled in prekindergarten funded by the state (Barnett et al., 2011). Similarly, as organizations, communities, and families became more aware of the powerful influence of prekindergarten on student academic achievement, the federal government chose to decrease their funding for prekindergarten education in these budget cycles.

Through the 2009 American Recovery and Reinvestment Act, \$100 billion was provided to the United States Department of Education to fund over 325,000 jobs, support, and resources to education (U.S. Department of Education, 2009). In addition to the funding provided within the American Recovery and Reinvestment Act, \$2 billion was provided to support early childcare. Only 2% of state prekindergarten funding was provided by the American Recovery and Reinvestment Act nationwide (Barnett et al., 2011). Based on the need to provide sustainable, high-quality childcare to improve school readiness for all children, supporters of prekindergarten encourage the government to increase initiatives for early childhood education (Barnett et al., 2003; Cohen, 1996; Magnuson & Waldfogel, 2005).

A proposal for voluntary, universal prekindergarten for all 4-year-olds in the United States was presented by President Obama's administration (Duncan, 2013). The president's proposal sought to reverse the decline of educational support for early childhood education by the state and federal governments. On average, the United States has invested very little funding for early education compared to all other developed nations. Of the 29 member nations of the Organisation for Economic Co-operation and Development, the United States is 28th among the 29. The Organisation for Economic

Co-operation and Development (2013) is an organization in which nations work together to improve the economic and social welfare of their people. Duncan (2013) noted that the 2013 federal funding proposed by the president was the most significant federal government funding for preschool since the 1965 inception of Head Start. The president's proposal called for prekindergarten programs that were high-quality to be made available for low to moderate income families using state and federal partnerships as funding. Over 1 million children were impacted by the proposal. As United States Secretary of Education, Duncan stated that it was a missed opportunity for a substantial return on a long-term investment due to the minimum federal government support provided for prekindergarten.

Theoretical Framework

Two overarching elements provide the context for the current research: cognitive and social constructivism. First, the idea that an individual's learning occurs based on his or her understanding, current schema, and interaction with the environment or background of experiences, is the foundation of cognitive constructivism (Powell & Kalina, 2009). Three critical factors to be considered in early childhood education are listed by the National Association of the Education of Young Children (2009) that make a good summary of this idea. In the School Readiness position statement, they stated:

At least three critical factors must be considered for readiness: the diversity of children's experiences as well as inequity in experiences, the wide variation in young children's development and learning, and the degree to which school expectations of children entering kindergarten is reasonable, appropriate, and supportive of individual difference. (p. 1)

Others including Jean Piaget, Lev Vygotsky, Friedrich Froebel, John Dewey, and Maria Montessori contributed evidence that supported these concepts (Beatty, 2009; Powell & Kalina, 2009).

Second, social constructivism tenets indicate that learning occurs through the framework of a combination of cognitive and social constructivism, just as Piaget (cognitive constructivism) and Vygotsky (social constructivism) had many overlapping ideas. As Piaget continually developed his cognitive constructivism theory, he included the social element (Beatty, 2009). However, the social elements included by Vygotsky were more prominently emphasized throughout the development of his learning theory. Both theories include elements of active education, recognize children as having the full potential to learn, perceive the role of the child as that of a researcher, and recognize the importance of the environment and the interaction with it (Hewett, 2001). Vygotsky, though, brought out the emphasis on language and communicating with others more profoundly than did Piaget. However, both saw the child as being in control of his or her learning by interacting with social and physical environments and adapting and learning through play and social situations (de Cos, 1997). This learning is facilitated by the teacher providing a stimulating environment that offers guidance and appropriate experiences to expand further development (de Cos, 1997). Children have innate knowledge fueled by curiosity and the drive for problem-solving. Through interaction with people and the environment, children are continuously revising their knowledge by making, accepting, and rejecting hypotheses (Welch & White, 1999). Both cognitive and social constructivism were used as frameworks on which the current research was conducted.

High-Quality Prekindergarten

Lazarus and Ortega (2007) stated that the most effective means of improving academic results is to ensure that quality prekindergarten is provided. Gayl et al. (2010) endorsed quality programs as making critical differences in school readiness. They noted that the opportunity to obtain quality instruction should be given to children to be ready for formal school expectations and obtain quality instruction. Laosa (2005) implied that for academic school success, the aim of voluntary or universal prekindergarten is for children to acquire necessary behaviors and skills. Laosa argued that fewer minority parents from lower educational backgrounds or low-income levels are projected to enroll their children in quality prekindergarten programs than parents of higher education backgrounds or higher socioeconomic status. Additionally, due to the types of funding received, many programs focus on specific populations of children. The focus on specific populations could lead to the over or underrepresentation of certain socioeconomic statuses or ethnicities in the research literature.

The prekindergarten experience should be of high quality to promote maximum benefits. *High quality* was defined by the National Institute for Early Education Research as a standards-based program for 4-year-olds that requires competitive compensation, teacher credentials, assistant credentials, professional development, program evaluation, low teacher/child ratios, program evaluation, meals, and health screenings (Barnett et al., 2008). Clifford et al. (2005) also included program length as a measure of quality. Barbarin et al. (2008) contended that the assets that educators determine to be quality along with those that parents determine to be quality often contrast. Barbarin et al. further emphasized that parents refer to teachers' relationships and their experience with children

as a quality essential. Mashburn and Pianta (2006) suggested that most parents refer to their children's learning of colors, numbers, and letters as a hallmark of a quality program.

Mashburn et al. (2008) posited that there are two groupings of quality: aspects of the classroom environment (direct experiences) and program design. Mashburn et al. included features of the National Institute for Early Education Research's definition to define the program design. There is no known mention of what direct experiences should include. Individuals can assume, through research, that direct experiences should include activities, lessons, routines, and interactions (Barnett et al. 2008; Burchinal et al., 2008; Mashburn et al., 2008). However, in these experiences, one cannot assume how quality is established. Gormley et al. (2005) mentioned that high-quality prekindergarten programs in Tulsa had a unique effect on amplified cognitive skills and language in African American and Hispanic children. Children who qualify for free or reduced lunch were also influenced. Only nominal effects for Caucasians were found in the study (Gormley et al., 2005). Variances emerged from these studies, raising the question as to whether they are due to differences in the comprehension and perspectives of program quality. Concerning former ideas that universal prekindergarten attracts middle-income and Caucasian families more than others, should it be concluded that universal prekindergarten may not, in reality, be universal?

Authors of the *State of Preschool 2008 Yearbook* suggested that progress was made in prekindergarten programs in the areas of higher standards and expansion (Barnett et al., 2008). This trend for growth has continued through the 2009-2010 school year (Barnett et al., 2011). One limitation to the report was that only state-supported

programs were reviewed in the yearbook. At that time, state-supported programs were only available for a total of 40 states. Thus, information from privately-funded programs such as Head Start and Title I was not provided (Barnett et al., 2011). Barnett and Robin (2006) argued that concerns about program cost and design hindered some of the expansion of the programs even though from 2002 to 2005, the number of children attending state-funded prekindergarten increased more than 100,000 children.

Taylor, Gibbs, and Slate (2000) reported that in Georgia and states where a high proportion of the budget is spent on prekindergarten, few studies have focused on the effects of preparing children for school and prekindergarten. Taylor et al. (2000) found that children who attended publicly-funded prekindergarten scored significantly higher on the Georgia Kindergarten Assessment Program compared to children who did not attend prekindergarten. The findings in this study were similar to Gormley et al. (2005) who found that children who attended publicly-funded prekindergarten programs performed better on Tulsa's state kindergarten assessments compared to those who did not attend. The assumption for most of these studies was that cognitive skills such as mathematics and literacy readiness performance were evaluated on state tests. Therefore, only cognitive skills were included, not social and behavioral competencies.

School Readiness

Over the years, school readiness has had several different definitions (Welch & White, 1999). Before 1990, school readiness measures only included cognitive skills such as numeracy skills, phonological awareness, and oral language. According to Kagan (1992), school readiness in the 1990s revealed a more extensive definition than that previously used. A social-emotional component was included in the revised definition

(Janus & Duku, 2007). The newer definition gave importance to the development of social-emotional competence and the aptitude to use those competence skills. Villares, Brigman, and Peluso (2008) linked cognitive skills, cooperation, in addition to problem-solving, with the effect on behaviors and attitudes that children relate or connect with the school. School readiness implies that young children are prepared for K-12 success (Howes et al., 2008; Lara-Cinisomo, Fuligni, Ritchie, Howes, & Karoly, 2008).

Mashburn et al. (2008) and Lara-Cinisomo et al. (2008) argued that these definitions are inadequate because credibility is not given to the dependence, by children, on opportunities to support the further growth of cognitive and social aptitudes. In their study of school readiness, Ladd, Herald, and Kochel (2006) emphasized that there should be additional school readiness components such as interpersonal skills. They contended that school success was evidence of excellent interpersonal skills. A surplus of skills and attitudes are incorporated into readiness for school.

When social and emotional dimensions are emphasized in prekindergarten, de Cos (1997) suggested that there are more positive effects on later academic achievement. Historically, kindergarten was the time in a child's life when the focus was on social and emotional domains, but kindergarten has become much more academic in this age of accountability. De Cos also stressed that universal prekindergarten could assist children and families with the transition to the social and emotional expectations of kindergarten and help diminish the differences in social and emotional development.

In a survey by the Public Policy Forum (2009), a majority of the kindergarten teachers surveyed felt that social and emotional development in addition to cognitive development, general knowledge, and language, were determined to be significant

contributors to success in kindergarten. Gayl et al. (2009) suggested that high-quality prekindergarten contributes significantly to social and emotional gains that allow children to be more successful throughout their school careers. According to Gayl et al., findings from a Chicago prekindergarten project revealed more significant gains in reading and math, lower grade retention, and fewer children placed in special education through sixth grade. The development of the social-emotional skills and their long-term effects on school success have also been presented in the Perry Preschool Project (Belfield, Nores, Barnett, & Schweinhart, 2006) and the Abecedarian Project (Currie, 2001). Researchers found significant results in success through lower grade retention, fewer placements in special education, lower crime rates, and lower support on welfare through adulthood.

Shephard and Smith (1986) stated that more than 3 million children begin kindergarten each fall and that the differences in their readiness to learn are tremendous. Kindergarten teachers in Milwaukee felt that those who attend prekindergarten were more likely to do better in kindergarten and beyond (Public Policy Forum, 2009). Taylor et al. (2000) suggested that attendance in a preschool program results in higher grades, higher achievement, and a lower likelihood of being retained in a grade or placed in special education. Early education implies a type of care that is not only responsive to a child's physical and emotional needs but also implies cognitive care (Magnuson et al., 2007). Magnuson et al. (2007) found that attendance in a preschool program significantly increases academic school readiness. The findings of Taylor et al. (2000) study 7 years earlier were similar to these results.

Regarding Title I prekindergarten, Gayl et al. (2010) indicated that prekindergarten assists children and families in the area of school readiness by providing

for a seamless transition to kindergarten. The prekindergarten classes that are aligned with an elementary vision can be considered a school readiness reform effort and can help children have the social and emotional background experiences that allow for future school success and help reduce academic achievement gaps between groups of students. In Elk Grove, California, significant gains were realized in reading and mathematics through third grade for children who attended prekindergarten as opposed to those who did not (Gayl et al., 2010).

Kindergarten has become so academically oriented because of accountability measures, and prekindergarten offers one avenue to help children be prepared for academic demands, structure, routine, and experiences (Perry, 1999). Pratt (1997) suggested that children in high-quality prekindergarten achieve at a higher level and also develop an attitude toward learning that aids them throughout their school experiences. Campbell and Ramey (1994) found that school readiness and kindergarten success are increased when children attend literature-rich prekindergarten and regular elementary school. In addition, Kraft-Sayre and Pianta (2000) proposed that teachers of prekindergarten should take steps to increase transitional success. Transitional success activities include introducing children and families to kindergarten teachers, allowing prekindergarten children to visit kindergarten classes, reading stories, and singing songs that are used in kindergarten as well as a host of other activities. This supports the stance of the National Education Goals Panel (1999) that school readiness aids the child, the school, and the family/community support structure. In a survey of kindergarten teachers, 97% felt they could identify children early in the school year who had attended prekindergarten (Public Policy Forum, 2009). These same teachers felt that

prekindergarten was important to success in kindergarten. Stuber and Patrick (2010) indicated that prekindergarten teachers should be used to build a stronger bridge to K-12 education.

Lara-Cinisomo et al. (2007) used focus groups to analyze the essential aspects of school readiness. The study was based on prekindergarten as designed to expand future chances of school success for children. The study was also based on beliefs that elements of school readiness were crucial to student performance in the future. Although some differences in elements of school readiness existed, the focus groups agreed that prekindergarten should address multiple educational aspects of a child to help with the transition to school, and programs should emphasize social and academic skills. Also, educators and parents should help ensure children are ready for social and academic expectations and challenges in school.

There is a possibility, based on combining the results of these studies that there may be more inessential variables that can be accounted for in one study. Molfese et al. (2006) contended that a critical time to meet the needs of children is in prekindergarten. Children who may have achievement gaps in their cognitive development, specifically in reading readiness, might benefit from their participation in a prekindergarten program.

Reading Readiness

Focusing on the growth of skills and attitudes that are linked to later reading success and achievement develops a child's reading readiness (Whitehurst & Lonigan, 1998). These skills include phonological awareness, alphabet knowledge, and concepts of print. Bierman et al. (2008) supported the notion of reading readiness skills as the foundation of success with the formal reading instruction that begins in kindergarten and

first grade. Fischel et al. (2007) suggested that prekindergarten provides an opportunity for the development of these skills. These skills help develop the motivation needed for later academic success. Furthermore, Fischel et al. emphasized that phonological awareness, concepts of print, alphabet knowledge, and oral language are skills necessary for a child to be a successful reader. Bierman et al. (2008) and Fien, Kame'enui, and Good (2009) stated that the development of these skills is the foundation for success with later formal reading instruction.

Molfese et al. (2006) contended that the growth of reading readiness skills in preschool ages affects academic development in elementary school. Children who develop alphabet knowledge skills perform at higher levels on phonological awareness and word reading assessments in kindergarten and first grade. Good, Gruba, and Kaminski (2001) emphasized that fluency in letter naming is a reliable indicator of the development of other reading skills that lead to reading success. Fien et al. (2009) also supported letter naming as the most stable predictor of later reading performance. Muter and Diethelm (2001) found that letter knowledge is the marker of reading skill development in both English and non-English speaking children. Others noticed that research supports the relationship between alphabet knowledge and phonological awareness (Good et al., 2001; Molfese et al., 2006; Simmons et al., 2000). Further, a relationship can be found between the development of these skills in preschool and reading skills in traditional elementary school. Children who develop the skills to be successful readers will become successful readers (Masseti, 2009).

The National Institute of Child Health and Human Development (2000) found that before formal reading instruction, reading readiness requires foundational knowledge

such as phonemic awareness, concepts of print, and letter naming. Lonigan, Burgess, and Anthony (2000) confirmed that phonological and print awareness are two critical areas that predict reading success in later school years. One can conclude that the prekindergarten environment should offer opportunities for children to develop skills in letter identification, phonemic awareness, and concepts of print to be successful readers in elementary and later school years. According to the National Institute of Child Health and Human Development (2000), the two best predictors of future reading acquisition are phonemic awareness and letter knowledge. The ability to focus on or hear sounds or phonemes and manipulate the phonemes in spoken words is referred to as phonemic awareness (Good et al., 2001). Phonemic awareness includes conscious control of the sound structure so that the sounds can be manipulated, substituted, and recombined (Lundberg, 2009). According to Lundberg, Olofsson, and Wall (1980), there exists a healthy relationship between phonemic awareness and successful reading. Lundberg (1998) supported phonemic awareness as an essential prerequisite for becoming a successful reader. Phonemic awareness is a critical enabling skill for reading acquisition.

Young children learn concepts of reading before formal school (McCormick & Mason, 1984). There exists a hierarchy of pre-reading concepts, including concepts of print or the knowledge that spoken words can be written as well as letter-sound characteristics. Reading readiness requires fundamental knowledge such as these concepts of print and letter knowledge before formal reading instruction (National Institute of Child Health & Human Development, 2000). Lundberg (1998) stated that “once the alphabetic principle is grasped the child is equipped with a powerful self-teaching mechanism for further exploration of the print environment where the reading

skill is developed and refined” (p. 156). Children gradually construct the idea of the symbol-language relationship and come to realize this relationship through their exposure to books and the written language (Lundberg, 1998).

Good et al. (2001) implied that alphabetic principles include alphabetic understanding and recoding strings of letters into sounds that can then be blended into words. Only recently has it been realized how much information children can acquire about print before formal instruction and how it affects the success of the instruction they receive after beginning their formal school careers (McCormick & Mason, 1984). Later reading success is influenced by the proficiency of emergent reading skills (National Institute of Child Health and Human Development, 2000).

The National Institute of Child Health and Human Development (2000) provided evidence of the skills, experiences, and knowledge children need to become successful readers. Young children need to develop the early literacy skill of phonemic awareness, alphabetic understanding, and automaticity with the code to be on track to attain later formal reading outcomes (Simmons et al., 2000). Good et al. (2001) argued that since the improved reading achievement of all children is a national, state, and local school district goal, a good strategy is to prevent reading difficulties from the beginning. Molfese et al.’s (2006) strategy was to prevent reading difficulties from the beginning, and they contended that high-quality prekindergarten provides children with experience in the critical reading skills that address this problem. Good et al. (2001) also advocated using a valid and reliable assessment system that provides information on these essential skills and allows educators to plan appropriate future reading instruction. Literacy skill

deficiencies should be identified and corrected early before modifications to informal reading instruction are necessary.

Mathematics Readiness

According to a study conducted by Freeman and Hatch (1989), instruction in the primary grades and beyond is skills-centered, especially in reading and mathematics.

“Thus, although the socializing role of kindergarten can hardly be debated, the weight of this role in contrast to other more child-centered roles of kindergarten needs to be reconsidered” (Freeman & Hatch, 1989, p. 603). Pasnak, Holt, Campbell, and McCutcheon (1991) stated that 5-year-old children are highly variable in their cognitive functioning. Some are still in the preoperational stage of cognitive development.

Children’s thinking remains closely tied to perceptual properties of the objects they are considering. Consequently, the children frequently classify items inappropriately. Pasnak et al. also added that at the age of five, the mental operations of seriation—arranging objects sequentially according to some gradation of size, space, number, time, and shape—is often deficient.

Campbell and Ramey (1994) conducted a study to determine if early intervention with a high-quality prekindergarten program would affect intellectual and academic achievement in children. They believed that the children’s cognitive development should be enhanced through strengthening the intellectual stimulus value and developmental appropriateness of the early environment. Coming from this *improved* environment, the children should enter school with a higher degree of school readiness and an enhanced likelihood of success. The results of the study indicated that the intellectual and academic gains were significant and persisted through 7 years of school.

Necessary changes in mathematics education in prekindergarten through first grade have occurred that may be influencing young children's mathematics scores over time. The Principles and Standards for School Mathematics included prekindergarten standards for the first time (National Council of Teachers of Mathematics, 2000). Clements, Sarama, and DiBiase (2004) pointed out that a conference titled *Standards for Pre-Kindergarten and Kindergarten Mathematics Education* was held in 2000 and included recommendations for prekindergarten to second-grade mathematics' standards. The National Association for the Education of Young Children (2009), in conjunction with the National Council of Teachers of Mathematics, released a joint policy statement that identified the importance of researched-based, high quality, and challenging mathematics instruction beginning in prekindergarten in 2002. Then, in 2006, the National Council of Teachers of Mathematics published the Curriculum Focal Points, an essential document for prekindergarten standards.

As a result, between 2002 and 2010, states adopted or revised their standards for prekindergarten children to include mathematics as a critical component of early learning standards (Brenneman, Stevenson-Boyd, & Frede, 2009; Scott-Little, Kagan, & Frelow, 2005; Scott-Little, Lesko, Martella, & Milburn, 2007). The early learning guidelines for prekindergarten children identified the content and performance expectations around mathematical content areas for the instruction of children beginning in prekindergarten. Many states had comprehensive professional development approaches recommended for the preservice and practicing early childhood teachers and personnel who interact with the children that focus on the implementation of the early learning guidelines for mathematics (Burchinal, Hyson, & Zaslow, 2008).

Role of Demographics in the Literature

Focusing on early reading skills for all populations of children including low socioeconomic status, at-risk, and minorities have been encouraged in early-childhood programs (Witte & Trowbridge, 2005). The at-risk categories often include populations with low SES and minorities (Clifford et al., 2005). One goal of prekindergarten is to improve early educational experiences so that all children may enter school healthy and ready to learn (Bryant et al., 2003). Regulatory entities, whether federal, state, or local, usually support prekindergarten based on the grounds of equity for at-risk populations (Currie, 2000). Certain demographic variables might be considered at-risk factors that affect the success of children early in their school career. Janus and Duku (2007) further suggested that these at-risk factors seemed to follow the individual into adulthood.

The effects of prekindergarten are often more significant for disadvantaged children (Currie, 2000), especially children of families in poverty (Conn-Powers, Cross, & Zapf, 2006). Socioeconomic variables reliably correlate to educational outcomes (Janus & Duku, 2007). Janus and Duku (2007) reported that being economically disadvantaged is strongly correlated with lower cognitive outcomes through the third grade. Children from low SES are targeted in many prekindergarten programs (Mashburn, Justice, Downer, & Pianta, 2009). For example, in North Carolina, almost half of the prekindergarten funds provide for the poor through child care subsidies (Bryant et al., 2003). Many governmental agencies invest funds in targeting students from low SES environments based on research findings that prekindergarten enhances readiness for school, especially in children at risk of educational difficulties because of poverty (Barbarin et al., 2008; Gormley et al., 2005). Children raised in poverty-stricken

situations are particularly likely to experience difficulties in school (Bierman et al., 2008). These children are often identified as poor readers. Difficulties in schools may be exacerbated by the lack of home learning opportunities such as stimulating conversations and interactions as well as emotional support (Bierman et al., 2008).

In the Henry et al. (2003) study on Georgia prekindergarten programs, children from economically disadvantaged backgrounds began prekindergarten scoring below the national norms on tests of reading and mathematics. After prekindergarten, this same group began kindergarten scoring above the national norms. Burchinal et al. (2008) revealed low-income children scored below national norms on language and academic tests at the beginning of prekindergarten. Burchinal et al. used demographic covariates such as gender, ethnicity, maternal education, and English as a second language in their study. After adjusting for the covariates, children who attended prekindergarten scored at significantly higher levels than their counterparts who did not attend prekindergarten. Magnuson et al. (2004) reported that children from low-SES backgrounds benefitted more from prekindergarten than children from more advantaged backgrounds. Significant differences were reflected in the data between the groups existing at the beginning of prekindergarten, but no differences were noted at the end of prekindergarten. In a study by Bryant et al. (2003) poverty was a strong predictor of lower scores on reading, mathematics, and language. Mashburn et al. (2009) attributed risk of academic deficiencies to low SES but supported public prekindergarten as having the potential to decrease the achievement gap.

Another demographic variable often controlled in the literature was ethnicity. The perspective from which a family interprets the quality of a prekindergarten program

differs by ethnicity and poverty status (Barbarin et al., 2008). Ethnicity may be associated with differences in language, values, and experiences that affect how families perceive quality prekindergarten. Andrews and Slate's (2001) findings were statistically significant regarding kindergarten readiness as a function of ethnicity. In all areas (reading, mathematics, and language), Caucasians scored at significantly higher levels than other ethnicities. Wong et al. (2008) evaluated five states' prekindergarten programs and concluded that there were similar significant differences, as in previous studies, in academic achievement based on ethnicity and poverty. Clifford et al. (2005) found that programs targeting students from low-SES environments had a higher percentage of African American and Latino students than the population at large. African American and Latino children were more likely to be identified as low SES. It is often difficult to separate ethnicity from socioeconomic status. Providing prekindergarten targeted for low SES is often viewed as a way to lessen the achievement gap between poor and non-poor groups as well as between Caucasian and non-Caucasian groups. Gormley et al.'s (2005) findings revealed that minorities of low socioeconomic status in the Tulsa prekindergarten benefitted most from their prekindergarten experiences.

The last demographic variable to be presented was gender. Gender is not considered an at-risk factor by itself (Mashburn et al., 2008), but when combined with ethnicity and SES, there can be an effect that bears further consideration (Janus & Duku, 2007). Janus and Duku (2007) analyzed prekindergarten data for contributions to an identified achievement gap that included five areas of at-risk factors as well as age and gender. The researchers found that males from low-SES households were twice as likely to be identified as at-risk for difficulties with success versus school entry as females. In a

study on the North Carolina Smart Start prekindergarten program, Bryant et al. (2003) found that boys scored significantly lower than girls on reading and mathematics. Throughout many studies presented in this literature review, gender, SES, and ethnicity were controlled in the analyses (Andrews & Slate, 2001; Bryant et al., 2003; Burchinal et al., 2008; Gormley et al., 2005; Janus & Duku, 2007; Mashburn et al., 2008). Although all three demographic variables were not always found to contribute to significant differences, the emphasis on the possible influence on outcome data was presented. These studies (Andrews & Slate, 2001; Bryant et al., 2003; Burchinal et al., 2008; Gormley et al., 2005; Janus & Duku, 2007; Mashburn et al., 2008) used the variables of gender, ethnicity, and socioeconomic status either as independent or covariate variables. These studies influenced the present prekindergarten study to be outlined and discussed in chapters three and four.

Summary

Although prekindergarten has been shown to be useful for populations of children from various backgrounds (Burchinal et al., 2008; Early et al., 2007; Magnuson et al., 2007; Mashburn & Pianta, 2006; Molfese et al., 2006; Wong et al., 2008), effectiveness can be interpreted in a variety of ways. The idea of early childhood care is not new, but after President Bush's Goals 2000, emphasis on high-quality prekindergarten was renewed. High quality is another term that can be interpreted differently by different groups of people (Barbarin et al., 2008; Barnett et al., 2009; Clifford et al., 2005; Gormley et al., 2005; Mashburn & Pianta, 2006; Mashburn et al., 2008), but they all seemed to agree that quality, no matter the exact definition, is an important facet. Currently, billions of dollars of federal, state, and local resources are being spent on

prekindergarten to promote school readiness (Barnett et al., 2008). Perry (1999) argued that more high-quality prekindergarten programs in public schools, staffed with well-trained teachers using developmentally appropriate practices, will help children.

CHAPTER III

METHODOLOGY

Throughout history, philosophers and educational researchers have emphasized the need for an educated citizenry. Today's educators rely on the information obtained from quality research studies to develop programs to educate the populace. Educators and researchers such as Froebel, Montessori, and Piaget have long stressed the benefits of beginning formal education in early childhood. The Perry Preschool Project (Weikart, 1970), the Carolina Abecedarian Project (Ramey et al., 1984), and the Chicago Child-Parent Center Program (Naisbitt, 1968) are three examples of early childhood education studies that have explored the effect of prekindergarten program participation from a longitudinal perspective. These studies have provided evidence of the long-term benefits that prekindergarten education gives throughout the lives of participating children.

The question remains, however, are all student receiving the same quality education when looking at demographics within the state of Arkansas? According to the Arkansas Department of Education (2012), excellent programs must display the following characteristics: (a) ensure the curriculum is scientifically-based and developmentally appropriate for early childhood learners, (b) hire teachers who possess the credentials of a highly qualified teacher, (c) have the support of the family through a robust parental involvement program, and (d) provide ongoing staff training. Arkansans have worked to provide early childhood education services for the state's students. Programs in Arkansas that have influenced the education of the early childhood learner include district-funded and

tuition-supplemented preschools such as Head Start and ABC preschool program. These programs have all played a part in the education of Arkansas' early childhood learners. Regardless of the specific type of program, early childhood education programs need to strive for excellence.

The ABC preschool program is known as Arkansas' preschool program. At least three studies have been conducted to determine the effectiveness of the ABC preschool program (Hustedt, Barnett, & Jung, 2008; Hustedt, Barnett, Jung, & Thomas, 2007; Jung, Barnett, Hustedt, & Francis, 2013). These studies were based on examinations of state-wide data sets. All three studies have provided some evidence of the benefits of an ABC preschool program education. The purpose of this study was to examine, through quantitative methods, the differences in early literacy and mathematics readiness of kindergartners who attended the school district's ABC prekindergarten program and those who did not. Although this chapter presents the research design and methods used to investigate the differences in kindergarten readiness in the areas of literacy and mathematics, the factors of gender and ethnicity were also variables in the study. This investigation was used to evaluate prekindergarten student gains in the development of early literacy and mathematics skills, depending on the nature of their prekindergarten program.

This chapter is composed of an explanation of the research design, the sample, the procedures, the data collection procedures, and the analysis of the data. The research design and justification for selecting the prekindergarten students as the research population is presented in this chapter. The chapter also includes a description of the instrument used to collect data in the study, the data collection procedures, and the statistical process used to analyze the data. Finally, limitations that could influence the validity of the study are provided.

Research Design

According to Gay, Mills, and Airasian (2012), the quantitative research method is based on the belief that people inhabit a coherent world that can be described as relatively stable and uniform. With stability and uniformity, people can understand, measure, and generalize about the world. One expert described quantitative research as being “strongly concerned with identifying causal, correlative or other kinds of close associations between events processes, and consequences occurring in the mental and social lives of humans” (Reznitskaya, 2004, p. 68). This view was adopted from the natural sciences and implies the world people live in and the laws people abide by are predictable and can be understood by scientific research. Quantitative research permits the investigator to rely on statistical analysis (mathematical analysis) of the data that is typically in numeric form (Creswell, 2009). The numerical data according to Gay et al. (2012), allow a researcher to collect and analyze the data to describe, explain, predict, or control phenomena of interest. The evaluation resulted in an analysis of the relationship between early literacy and mathematics achievement and prekindergarten programs.

I used a quantitative, causal-comparative approach for this study. In a causal-comparative study, I did not use random assignment and did not have control over the independent variables (Gliner & Morgan, 2000). Also, grouping variables like gender or ethnicity could not be manipulated (Newman & Benz, 1998). Instead, this causal-comparative study was used to gain information about only a possible cause-effect relationship (Cohen, Manion, & Morrison, 2000). In this research, I sought to determine if a difference existed in the achievement of students enrolled in an ABC prekindergarten program compared to students not enrolled in the Central Arkansas school district. The ABC

program was already being used in the district, and students self-selected to be in the program.

Using a quantitative, causal-comparative strategy, I attempted to identify the cause-effect relationship between prekindergarten participation and academic achievement by examining data consisting of kindergarten student literacy and math scores from NWEA MAP Growth assessments and the independent variables of gender and ethnicity. In the first and second hypotheses, a 2 x 2 factorial between-groups design was used. The independent variables for these two hypotheses were gender and prekindergarten participation (ABC prekindergarten program participation and no ABC program participation). The dependent variables were literacy and mathematics achievement, as measured by NWEA MAP Growth assessment for kindergartners, respectively. The third and fourth hypotheses also used a 2 x 2 factorial between-groups design, with the independent variables being ethnicity (White versus non-White) and prekindergarten participation. The dependent variables were literacy and mathematics achievement, as measured by NWEA MAP Growth assessment for kindergartners, respectively. I used posttest scores only for the analysis.

Sample

Scores from students in all nine elementary schools in the Central Arkansas school district were used as the accessible population in the study. The kindergarten students' scores were identified as having participated in the district's ABC prekindergarten program or having no prekindergarten participation based on the APSCN and data retrieved from the participating district. The scores were also categorized by gender and ethnicity on their early readiness in literacy and mathematics. Therefore, the scores were stratified by gender (male and female students), ethnicity (White and non-White students), and ABC prekindergarten participation (students who participated and students with no prekindergarten participation).

From the stratified subgroups, kindergarten students' scores were randomly chosen using an online research randomizer. Based on gender, the sample for Hypotheses 1 and 2 included literacy and mathematics scores for 30 male and 30 female students who attended prekindergarten and 30 male and 30 female students who had no prekindergarten participation. For Hypotheses 3 and 4, the sample of literacy and mathematics scores included 30 White students who had attended prekindergarten, 30 non-White students who had attended prekindergarten, 30 White students who had no prekindergarten participation, and 30 students identified as non-White with no preschool participation.

Instrumentation

I used results from the Fall 2016 administration of NWEA MAP Growth assessment. Kindergarten students were assessed using the NWEA MAP Growth assessment in both literacy and mathematics. According to NWEA (2013), the MAP assessment is a computerized adaptive assessment designed to assist with classroom instruction by presenting teachers with the knowledge of what students know and what students are ready to learn. By dynamically adjusting to each student's performance, MAP Growth creates a personalized assessment experience that accurately measures performance—whether a student performs on, above, or below grade level. Each test item on a MAP assessment corresponds to a value on the RIT scale (NWEA, 2013). The MAP offers assessments in mathematics, reading, language, and science. MAP assessments provide detailed data about what a student has learned academically and what a student needs to learn to move forward academically or obtain a higher RIT score. NWEA provides on-site and online training for MAP administration. Training is provided to district and school level MAP coordinators, proctors, teachers and others who will administer the assessment or use the assessment data.

Many schools use the NWEA-MAP instrument because of its reliability and validity claims. Educators are choosing to use NWEA-MAP as a viable assessment option (Merino & Beckman, 2010). NWEA-MAP assessments allow schools to use an adaptive assessment that provides academic information that may be used promptly. After a student has taken a MAP assessment, teachers can review instructional data that outlines what a student knows and is ready to learn next. In addition, NWEA's (2012) researchers have collected an extensive amount of evidence over the years to support the reliability and validity of NWEA assessments. NWEA researchers have analyzed the results of thousands of students in several states to determine if their assessments are reliable and possess content, concurrent, predictive, and criterion-related validity. NWEA determined that their MAP assessments are both reliable and valid.

Data Collection Procedures

The NWEA MAP Growth assessment was administered to students in August of 2016. After receiving Institutional Review Board approval in the fall of 2018, I obtained existing data documents from the Central Arkansas school district and used school assessment records for the study. Names were replaced with numbers to maintain confidentiality. I received data from Central Arkansas school district in June 2017. To ensure the accuracy and credibility of the data, I spoke with various people, including school secretaries, district instructional specialists, school counselors, and the district APSCN coordinator. I then compared NWEA MAP Growth assessment scores of students who attended prekindergarten with students who had no prekindergarten participation.

For the first and second hypotheses, the NWEA MAP Growth assessment scales scores in literacy and mathematics, students' gender, and prekindergarten attendance were used. The data collected for gender and prekindergarten attendance were coded as follows: (0

= male, 1 = female) and prekindergarten attendance (0 = ABC prekindergarten participation, 1 = no prekindergarten participation). For the third and fourth hypotheses, data collected consisted of the NWEA MAP Growth assessment scales scores in literacy and mathematics, students' ethnicity, and prekindergarten attendance. The following coding was used: (0 = White, 1 = non-White) and prekindergarten attendance (0 = ABC prekindergarten participation, 1 = no prekindergarten participation).

Analytical Methods

I began the analytical methods by examining the data from the nine elementary schools. Once this was completed, I began compiling the data into an Excel spreadsheet. The focus of the data was scale scores in literacy and mathematics, prekindergarten attendance, ethnicity, and gender. Columns were made to identify each student's scale score in literacy and mathematics, as well as the student's prekindergarten participation, ethnicity, and gender. The spreadsheet, once completed, was used to input data in the *IBM Statistical Package for the Social Sciences (SPSS) Version 25*.

The SPSS software was used to run a factorial ANOVAs of the hypotheses. Before running the statistical analysis, assumptions of normality and homogeneity of variances were checked. Also, descriptive statistics were used to examine the data. To address the first hypothesis, a 2 x 2 factorial ANOVA was conducted using ABC prekindergarten participation (as identified by APSCN and received from district personnel) and gender as the independent variables, and the overall literacy achievement as measured by the NWEA MAP Growth assessment as the dependent variable. The second hypothesis was analyzed by a 2 x 2 factorial ANOVA with ABC prekindergarten participation and gender as the independent variables, and the overall mathematics achievement as measured by the NWEA MAP Growth assessment as the dependent variable. Hypothesis 3 was examined by a 2 x 2 factorial

ANOVA using ABC prekindergarten participation and ethnicity (White or non-White) as the independent variables, and the overall literacy achievement as measured by the NWEA MAP Growth assessment as the dependent variable. I conducted a 2 x 2 factorial ANOVA to test the fourth hypothesis with ABC prekindergarten participation and ethnicity as the independent variables, and the overall mathematics achievement as measured by the NWEA MAP Growth assessment as the dependent variable. To test the null hypotheses, a two-tailed test with a .05 level of significance was used.

Limitations

As with most research studies, limitations need to be noted to help the reader determine how to interpret the results of the studies. First, only one assessment instrument was used. This study sought to examine the relationship between prekindergarten attendance and achievement in mathematics and literacy. To do this, I examined kindergarten NWEA MAP Growth assessment literacy and mathematics scores. Although this is one standard measurement to define student achievement, additional methods of analyzing student achievement could be implemented in other studies that may result in finding contrary to those identified in this study.

Second, testing is another area where there is an identifiable limitation. There is an assumption that the NWEA MAP Growth assessment was administered following the guidelines, rules, and regulations of NWEA and the Central Arkansas school district. These attributes of the testing process could not be confirmed by me. I was also unaware if students were tested in small groups or whether student accommodations were in place during testing. The assumption was that individuals administering the NWEA assessment did so objectively, and the results accurately represented the students' performance.

Third, another limitation of this study was the accessible population. This study limited participation to those in the Central Arkansas school district. As a result, the findings from this study may not be generalizable when compared to other districts in Arkansas or other states. The test data were limited to students' scores from one Central Arkansas school district who completed the NWEA MAP Growth assessment.

Fourth, the quality of the prekindergarten experience was another possible limitation. Specific aspects of the prekindergarten programs were not investigated, leaving some unanswered questions: Did the program have a certified teacher for the entire year? How many absences did the students have? How many absences did the teacher have? How was student achievement assessed while students were in prekindergarten? How many years did the student attend prekindergarten? In addition, the study only included the information provided within the student enrollment forms. I assumed that the information provided on each student's enrollment form was correct and that each student's enrollment form was correctly coded into APSCN regarding gender, ethnicity, and ABC prekindergarten participation.

Fifth, there were several other variables that I concluded would delimit this study and potentially affect kindergarten school readiness that was not evaluated in this particular study. Examples of those variables were parents' educational background, number of days absent from school, and educational experiences before prekindergarten. There were also sample limitations. This study did not employ a purely random sample; instead, convenience sampling was used. This study required selecting a public school district that used the same assessment tools and had students who attended a prekindergarten feed into the schools located in the district. Also, the time frame of this study was limited to one school year based on the NWEA data from the 2016-2017 school year. Furthermore, it was not known if

students in the study had been taught by a highly qualified teacher while in prekindergarten. This information was not investigated when compiling data for the study.

Sixth, an additional limitation to this study was that it was not known if the students who did not attend prekindergarten in Central Arkansas school district did not attend prekindergarten in another school district or participate in a Head Start or other Early Childhood program before enrolling in Kindergarten. Also, it was not known whether or not students were receiving tutoring or other academic assistance beyond the regular school day.

Summary

In Chapter III, I provided details about the research design of the study, the accessible population, and sample, the instrument used for gathering students' test scores, the data collection procedure, and the limitations. I further elaborated on the statistical procedures used to analyze student performance that resulted from different prekindergarten participation experiences. In a quest to improve student readiness for kindergarten and early literacy skills, many organizations are prompting educators to meet critical needs earlier and more effectively. Regardless of prekindergarten type, students should be provided with early literacy and mathematics instruction that prepares them for future academic success. Chapter IV includes the findings of the statistical analyses and descriptive statistics.

CHAPTER IV

RESULTS

This study was a quantitative, causal-comparative analysis of four 2 x 2 between group designs. The independent variables for Hypotheses 1 and 2 were gender (male versus female) and ABC prekindergarten participation status (participation versus no participation). The independent variables for Hypotheses 3 and 4 were ethnicity (White versus non-White) and ABC prekindergarten participation status (participation versus no participation). The dependent variable for Hypotheses 1 and 3 was literacy achievement for kindergarten students at the beginning of year measured by Northwest Evaluation Association assessment. The dependent variable for Hypotheses 2 and 4 was mathematics achievement for kindergarten students at the beginning of year measured by Northwest Evaluation Association assessment.

Analytical Methods

The four hypotheses were analyzed using *IBM Statistical Packages for the Social Sciences Version 25* (IBM Corporation, 2016; Morgan et al., 2012). Data for Hypotheses 1 and 2 were coded according to gender (0 = male and 1 = female) and ABC prekindergarten participation status (0 = no participation and 1 = participation). Data for Hypotheses 3 and 4 were coded according to ethnicity (0 = White and 1 = non-White) and ABC prekindergarten participation status (0 = no participation and 1 = participation). Academic performance based on literacy and mathematics achievement for the

kindergarten students measured by Northwest Evaluation Association assessment was used as the dependent variables for the hypotheses. Four 2 x 2 factorial ANOVAs were used to conduct the analyzes. A two-tailed test with a significance level of .05 was used to test each null hypothesis. I assessed assumptions of normality and homogeneity of variances prior to statistical analysis of the hypotheses.

Demographics

Information, including demographical data and test scores, was comprised of existing standardized test scores for students in a Central Arkansas school district. I focused on kindergarten students from the combined population of all schools within the district. From the combined population of students, a stratified sample of 120 students' literacy and mathematics scores was chosen for the first two hypotheses. The procedure was repeated for Hypotheses 3 and 4.

Hypothesis 1

Hypothesis 1 stated that no significant difference will exist by gender between participation in the ABC Prekindergarten Program versus no participation in the program on the literacy achievement measured by the NWEA MAP Growth assessment for students entering kindergarten in a large urban school district in Central Arkansas. Homogeneity of variances and normality of distributions were tested. Skewness was less than 1, and kurtosis was less than 1. Table 1 displays the group means and standard deviations.

Table 1

*Descriptive Statistics for Gender by ABC Prekindergarten Participation in Literacy**Scores*

Gender	Participation	<i>M</i>	<i>SD</i>	<i>N</i>
Male	No	43.77	12.52	30
	Yes	47.73	11.30	30
	Total	45.75	11.99	60
Female	No	47.50	14.14	30
	Yes	44.00	12.48	30
	Total	45.75	13.34	60
Total	No	45.63	13.37	60
	Yes	45.87	11.96	60
	Total	45.75	12.63	120

Screening for extreme outliers was conducted, and no cases were found. The Shapiro-Wilk test was used to test for normality with $p > .05$ for each group, indicating that the data were normally distributed across all groups. Levene's test of equality of variances was conducted within ANOVA and indicated there was homogeneity of

variance across groups, $F(3, 116) = 0.58, p = .627$. Therefore, the assumption was met. To test Hypothesis 1, a 2 x 2 factorial ANOVA was conducted to evaluate the effects of ABC prekindergarten participation status by gender on NWEA literacy achievement. The results of the ANOVA are displayed in Table 2.

Table 2

Factorial ANOVA Results for ABC Prekindergarten Participation Status by Gender on NWEA Literacy Scores

Source	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>	<i>ES</i>
Gender	0.00	1	0.00	0.00	1.000	0.000
ABC PK Participation	1.63	1	1.63	0.01	.920	0.000
Gender*ABC PK Part.	418.13	1	418.13	2.61	.109	0.022
Error	18566.73	116	160.06			
Total	270154.00	120				

Insufficient evidence existed based on the interaction of the variables to reject the null hypothesis, $F(1, 116) = 2.61, p = .109, ES = 0.022$. Given that there was no significant interaction between the variables of ABC prekindergarten participation status and gender, the main effect of each variable was examined separately. The main effect

for gender on literacy performance was not significant, $F(1, 116) = 0.00, p = 1.000, ES = 0.000$. In addition, the main effect for ABC prekindergarten participation status on literacy performance was also not significant, $F(1, 116) = 0.01, p = .920, ES = 0.000$. Figure 1 displays the means for overall literacy academic performance as a function of ABC prekindergarten participation status and gender.

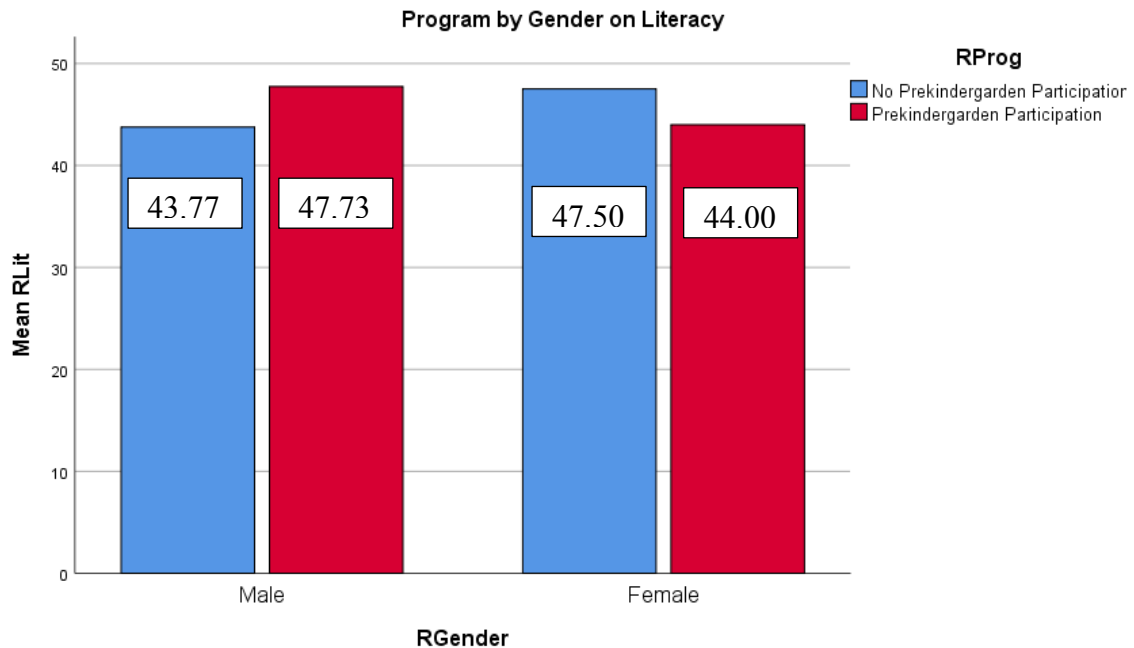


Figure 1. Means for literacy performance as a function of ABC prekindergarten participation status by gender.

The mean of the literacy scores for the group not participating in the ABC prekindergarten program regardless of gender ($M = 45.63, SD = 13.37$) was slightly lower than the group participating in the ABC prekindergarten program ($M = 45.87, SD =$

11.96). However, the difference was not significant. Similarly, the mean of the literacy scores for males regardless of ABC prekindergarten participation status ($M = 45.75$, $SD = 11.99$) was exactly the same as the mean for the females ($M = 45.75$, $SD = 13.34$).

Overall, the results indicated no combined significant effect of ABC prekindergarten participation status and gender on literacy performance. Similarly, there was no significant difference between the main effects of ABC prekindergarten participation status and gender.

Hypothesis 2

Hypothesis 2 stated that no significant difference will exist by gender between participation in the ABC Prekindergarten Program versus no participation in the program on the mathematics achievement measured by the NWEA MAP Growth assessment for students entering kindergarten in a large urban school district in Central Arkansas.

Homogeneity of variances and normality of distributions were tested. Skewness was less than 1, and kurtosis was less than 1. Table 3 displays the group means and standard deviations.

Table 3

Descriptive Statistics for Gender by ABC Prekindergarten Participation Status on Mathematics Scores

Gender	Participation	<i>M</i>	<i>SD</i>	<i>N</i>
Male	No	46.80	15.57	30
	Yes	40.50	12.90	30
	Total	43.65	14.53	60
Female	No	52.57	17.93	30
	Yes	51.73	15.05	30
	Total	52.15	16.42	60
Total	No	49.68	16.90	60
	Yes	46.12	15.01	60
	Total	47.90	16.02	120

Screening for extreme outliers was conducted, and no cases were found. The Shapiro-Wilk test was used to test for normality with $p > .05$ for each group, indicating that the data were not normally distributed across all groups. Levene's test of equality of variances was conducted within ANOVA and indicated there was no homogeneity of variance across groups, $F(3, 116) = 1.30, p = .277$. Therefore, the assumption was not met. To test this Hypothesis, a 2 x 2 factorial ANOVA was conducted to evaluate the effects of ABC prekindergarten participation status (prekindergarten participation versus no prekindergarten participation) by gender (male versus female) on NWEA mathematics achievement. The results of the ANOVA are displayed in Table 4.

Table 4

Factorial ANOVA Results for ABC Prekindergarten Participation Status by Gender on NWEA Mathematics Scores

Source	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>	<i>ES</i>
Gender	2167.50	1	2167.50	9.06	.003	0.072
ABC PK Participation	381.63	1	381.63	1.60	.209	0.014
Gender*ABC PK Part.	224.13	1	224.13	0.94	.335	0.008
Error	27753.53	116	239.26			
Total	305856.00	120				

Insufficient evidence existed based on the interaction of the variables to reject the null hypothesis, $F(1, 116) = 0.94$, $p = .335$, $ES = 0.008$. Given that there was no significant interaction between the variables of ABC prekindergarten participation status and gender, the main effect of each variable was examined separately. The main effect for ABC prekindergarten participation status on mathematics performance was not significant, $F(1, 116) = 1.60$, $p = .209$, $ES = 0.014$. However, the main effect for gender on mathematics performance was significant with a medium effect size, $F(1, 116) = 9.06$, $p = .003$, $ES = 0.072$. Figure 2 displays the means for overall mathematics academic performance as a function of ABC prekindergarten participation status and gender.

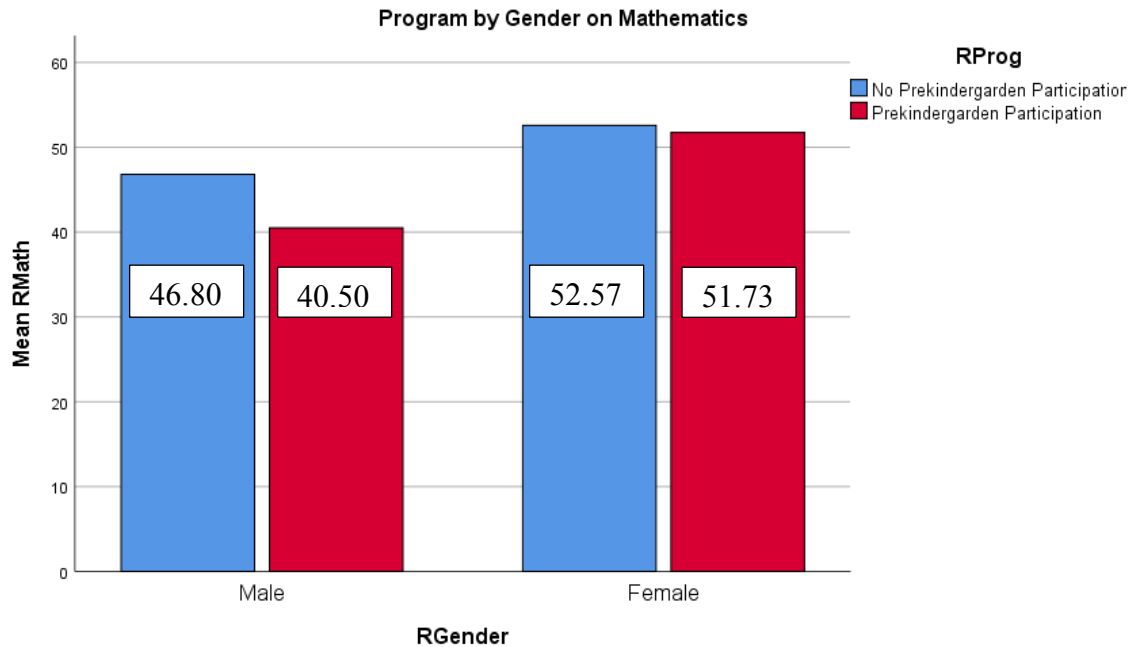


Figure 2. Means for mathematics performance as a function of ABC prekindergarten participation status by gender.

The mean of the mathematics scores for the group not participating in the ABC prekindergarten program regardless of gender ($M = 49.68$, $SD = 16.90$) was higher than the group participating in the ABC prekindergarten program ($M = 46.12$, $SD = 15.01$). However, the difference was not significant. However, regarding gender, the mean of the mathematics scores for males regardless of ABC prekindergarten participation status ($M = 43.65$, $SD = 14.53$) was significantly lower compared to the mean for the females ($M = 52.15$, $SD = 16.42$). Overall, the results indicated no combined significant effect of ABC prekindergarten participation status and gender on literacy performance. Similarly, there was no significant difference in the main effect of ABC prekindergarten participation status. However, a significant difference did exist for the main effect of gender.

Hypothesis 3

Hypothesis 3 stated that no significant difference will exist by ethnicity between participation in the ABC Prekindergarten Program versus no participation in the program on the literacy achievement measured by the NWEA MAP Growth assessment for students entering kindergarten in a large urban school district in Central Arkansas. Homogeneity of variances and normality of distributions were tested. Skewness was less than 1, and kurtosis was less than 1. Table 5 displays the group means and standard deviations.

Table 5

Descriptive Statistics for Ethnicity by ABC Prekindergarten Participation Status on Literacy Scores

Ethnicity	Participation	<i>M</i>	<i>SD</i>	<i>N</i>
White	No	51.93	14.06	30
	Yes	51.10	12.82	30
	Total	51.52	13.35	60
non-White	No	48.50	13.10	30
	Yes	41.00	10.30	30
	Total	44.75	12.28	60
Total	No	50.22	13.59	60
	Yes	46.05	12.60	60
	Total	48.13	13.22	120

Screening for extreme outliers was conducted, and no cases were found. The Shapiro-Wilk test was used to test for normality with $p > .05$ for each group, indicating that the data were normally distributed across all groups. Levene's test of equality of variances was conducted within ANOVA and indicated there was homogeneity of variance across groups, $F(3, 116) = 0.69, p = .563$. Therefore, the assumption was met. To test the Hypothesis, a 2 x 2 factorial ANOVA was conducted to evaluate the effects of ABC prekindergarten participation status (prekindergarten participation versus no prekindergarten participation) by ethnicity (White versus non-White) on NWEA literacy achievement. The results of the ANOVA are displayed in Table 6.

Table 6

Factorial ANOVA Results for ABC Prekindergarten Participation Status by Ethnicity on NWEA Literacy Scores

Source	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>	<i>ES</i>
Ethnicity	1373.63	1	1373.63	8.59	.004	0.069
ABC PK Participation	520.83	1	520.83	3.26	.074	0.027
Ethnicity*ABC PK Part.	333.33	1	333.33	2.08	.152	0.018
Error	18554.07	116	159.95			
Total	298800.00	120				

Insufficient evidence existed based on the interaction of the variables to reject the null hypothesis, $F(1, 116) = 2.08, p = .152, ES = 0.018$. Given that there was no significant interaction between the variables of ABC prekindergarten participation status and ethnicity, the main effect of each variable was examined separately. The main effect for ethnicity on literacy performance was significant with a medium effect size, $F(1, 116) = 8.59, p = .004, ES = 0.069$. However, the main effect for ABC prekindergarten participation status on literacy performance was not significant, $F(1, 116) = 3.26, p = .074, ES = 0.027$. Figure 3 displays the means for overall literacy academic performance as a function of ABC prekindergarten participation status and ethnicity.

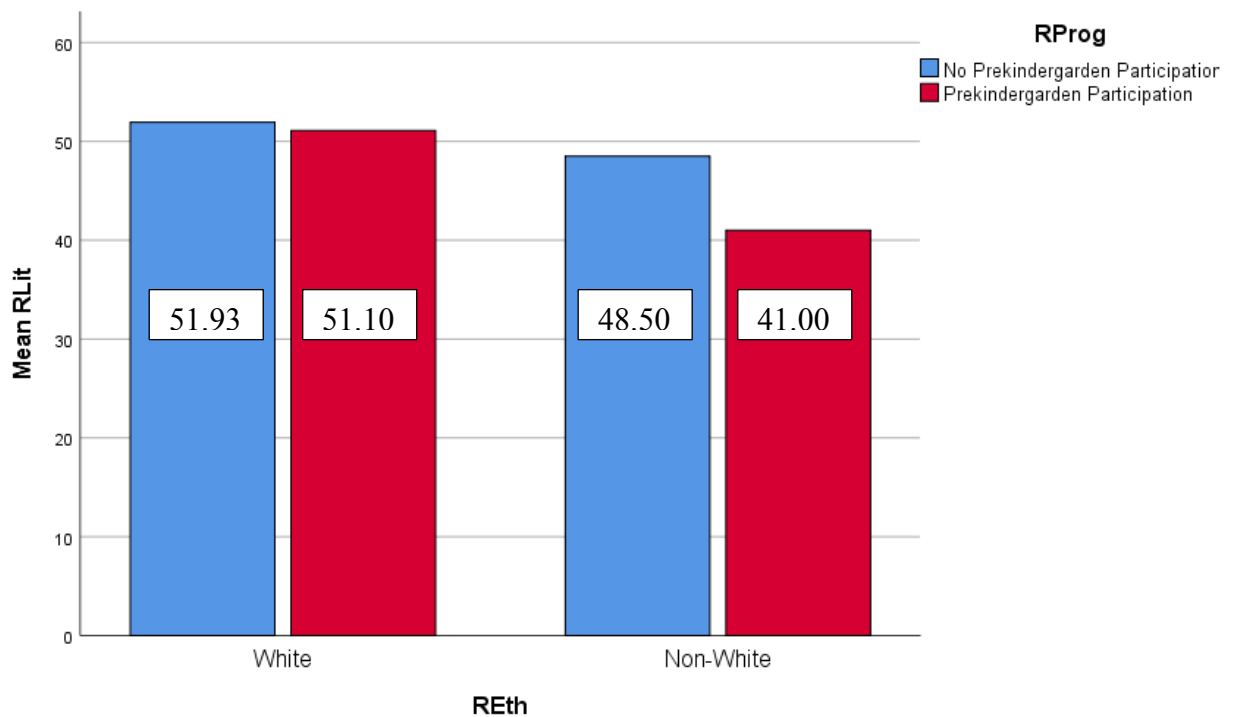


Figure 3. Means for literacy performance as a function of ABC prekindergarten participation status by ethnicity.

The mean of the literacy scores for the group not participating in the ABC prekindergarten program regardless of ethnicity ($M = 50.22$, $SD = 13.59$) was higher than the group participating in the ABC prekindergarten program ($M = 46.05$, $SD = 12.60$). However, the difference was not significant. However, the mean of the literacy scores for White students regardless of ABC prekindergarten participation status ($M = 51.52$, $SD = 13.35$) was significantly higher compared to the mean for the non-White students ($M = 44.75$, $SD = 12.28$). Overall, the results indicated no combined significant effect of ABC prekindergarten participation status and ethnicity on literacy performance. Similarly, there was no significant difference in the main effect of ABC prekindergarten participation status. However, the main effect of ethnicity was statistically significant.

Hypothesis 4

Hypothesis 4 stated that no significant difference will exist by ethnicity between participation in the ABC Prekindergarten Program versus no participation in the program on the mathematics achievement measured by the NWEA MAP Growth assessment for students entering kindergarten in a large urban school district in Central Arkansas. Homogeneity of variances and normality of distributions were tested. Skewness was less than 1, and kurtosis was less than 1. Table 7 displays the group means and standard deviations.

Table 7

Descriptive Statistics for Ethnicity by ABC Prekindergarten Participation Status on Mathematics Scores

Ethnicity	Participation	<i>M</i>	<i>SD</i>	<i>N</i>
White	No	53.87	18.71	30
	Yes	48.43	16.34	30
	Total	51.15	17.63	60
non-White	No	37.20	19.59	30
	Yes	46.50	17.74	30
	Total	41.85	19.11	60
Total	No	45.53	20.77	60
	Yes	47.47	16.93	60
	Total	46.50	18.89	120

Screening for extreme outliers was conducted, and no case was found. The Shapiro-Wilk test was used to test for normality with $p > .05$ for each group, indicating that the data were normally distributed across all groups. Levene's test of equality of variances was conducted within ANOVA and indicated there was homogeneity of variance across groups, $F(3, 116) = 0.44, p = .728$. Therefore, the assumption was met. To test this Hypothesis, a 2 x 2 factorial ANOVA was conducted to evaluate the effects of ABC prekindergarten participation status (prekindergarten participation versus no prekindergarten participation) by ethnicity (White versus non-White) on NWEA mathematics achievement. The results of the ANOVA are displayed in Table 8.

Table 8

Factorial ANOVA Results for ABC Prekindergarten Participation Status by Ethnicity on NWEA Mathematics Scores

Source	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>	<i>ES</i>
Ethnicity	2594.70	1	2594.70	7.89	.006	0.064
ABC PK Participation	112.13	1	112.13	0.34	.560	0.003
Ethnicity*ABC PK Part.	1628.03	1	1628.03	4.95	.028	0.041
Error	38147.13	116	328.86			
Total	301952.00	120				

The main effect for ABC prekindergarten participation status on mathematics performance was not significant, $F(1, 116) = 0.34, p = .560, ES = 0.003$. However, even though the main effect of ethnicity was significant with a medium effect size, $F(1, 116) = 7.89, p = .006, ES = 0.064$, a significant interaction effect between the variables of ABC prekindergarten participation status and ethnicity also existed with a small effect size, $F(1, 116) = 4.95, p = .028, ES = 0.041$. Due to this interaction, a simple effects analysis was conducted. Figure 4 displays the means for overall mathematics academic performance as a function of ABC prekindergarten participation status and ethnicity.

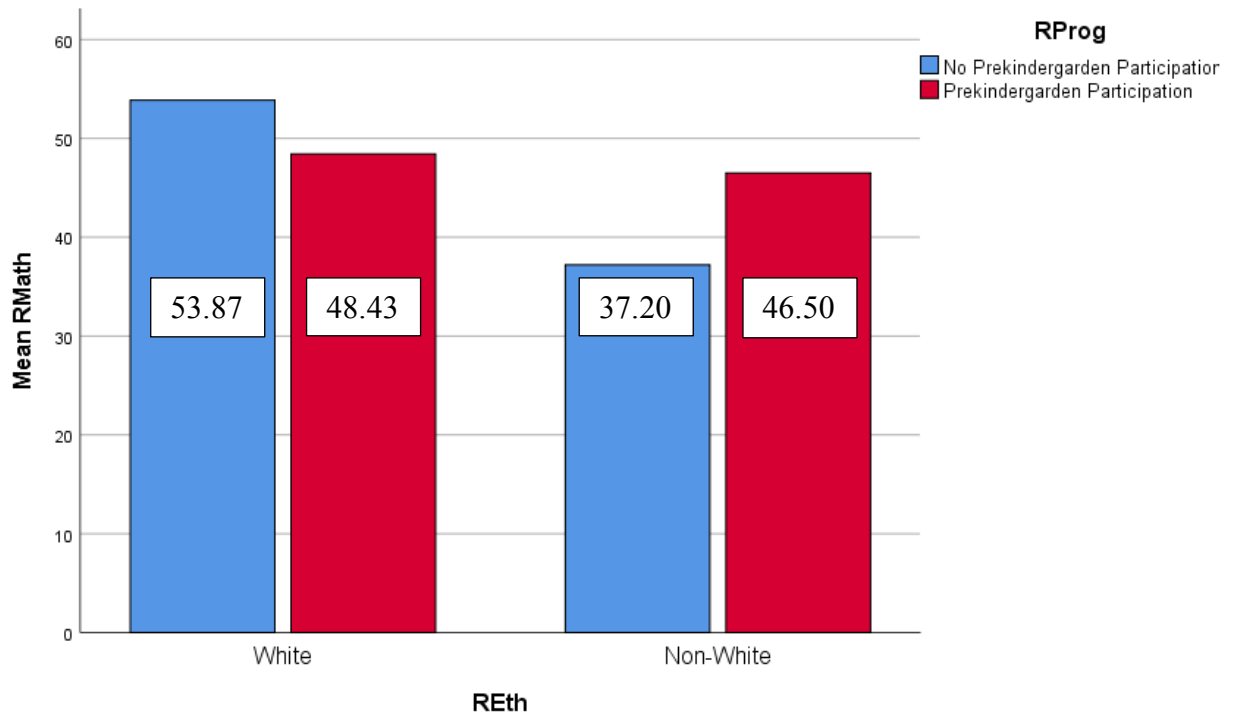


Figure 4. Means for mathematics performance as a function of ABC prekindergarten participation status by ethnicity.

Of the four groups created by the two independent variables in the fourth hypothesis (ABC prekindergarten participation/White, ABC prekindergarten participation/non-White, No ABC prekindergarten participation/White, No ABC prekindergarten participation/non-White), the results of the simple effects analysis indicated a significant difference between two of the pairings. Regarding the No ABC prekindergarten participation level across the two levels of ethnicity, the No ABC prekindergarten participation/non-White students ($M = 37.20$, $SD = 19.59$) scored significantly lower compared to the No ABC prekindergarten participation/White

students ($M = 53.87$, $SD = 18.71$), $p = .001$. In other words, in the two groups not participating in the ABC prekindergarten program, the non-White students, in general, scored statistically lower on their mathematics achievement compared to their White counterparts. Further, regarding the non-White level across the two levels of ABC prekindergarten participation status, the No ABC prekindergarten participation/non-White students ($M = 37.20$, $SD = 19.59$) scored significantly lower compared to the ABC prekindergarten participation/non-White ($M = 46.50$, $SD = 17.74$), $p = .049$. In other words, in the two groups of non-White students, those students not participating in the ABC prekindergarten program, on average, scored statistically lower on their mathematics achievement compared to those who participated in the ABC prekindergarten program. Thus, overall, the results indicated a combined significant effect of ABC prekindergarten participation status and ethnicity on mathematics performance. In addition, there was a significant difference for the main effect of ethnicity, but no significance was found for ABC prekindergarten participation status.

Summary

The purpose of this study was to determine the effects by gender and ethnicity between participation in the ABC prekindergarten program versus no participation in the program on literacy and mathematics achievement measured by the NWEA MAP Growth assessment for students entering kindergarten in a large urban school district in Central Arkansas. This study contained four hypotheses, all of which were 2 x 2 between-group designs. The independent variables for Hypotheses 1 and 2 were gender and ABC prekindergarten program participation status, and the dependent variables were literacy and mathematics, respectively. The independent variables for Hypotheses 3 and 4 were

ethnicity and ABC prekindergarten program participation status, and the dependent variables were literacy and mathematics, respectively. A summary of the four hypotheses is presented in Table 9.

Table 9

Summary of Statistical Significance of Gender, Ethnicity, and ABC Prekindergarten Participation Status on Overall Literacy and Mathematics Performance by Hypothesis

Variables by H ₀	H1	H2	H3	H4
Gender	1.000	.003		
Ethnicity			.004	.006
ABC PK Part. Status	.920	.209	.074	.560
Gender* ABC PK Part. Status	.109	.335		
Ethnicity* ABC PK Part. Status			.152	.028

For the first hypothesis, there was no significant interaction or main effects of gender and ABC prekindergarten program participation on literacy achievement. The second hypothesis revealed a significant main effect of gender on mathematics achievement with the females, on average, significantly outscoring the males. For the third hypothesis, the results indicated a significant main effect of ethnicity on literacy achievement. In this instance, the non-White students scored significantly lower on literacy compared to their White counterparts. Finally, for Hypothesis 4, there were two significant results in mathematics, the main effect of ethnicity and the interaction effect of ethnicity and ABC prekindergarten program participation. Because the interaction

effect helped explain the main effect of ethnicity, attention was given to the simple main effects analysis. Of the four groups created by the two independent variables, the results of the simple effects analysis indicated a significant difference between two of the pairings. First, the non-White students not participating in the ABC program scored significantly lower compared to the White students who did not participate in the ABC prekindergarten program. Second, the non-White students not participating in the ABC prekindergarten program scored significantly lower compared to the non-White students who participated in the ABC prekindergarten program. In all four hypotheses, however, there was no significant main effect for ABC prekindergarten program participation.

CHAPTER V

DISCUSSION

The current study explored the effects of ABC prekindergarten program status by gender and ethnicity on early literacy and mathematics readiness for students entering kindergarten in a large urban school district in Central Arkansas. Findings from the study indicated that no significant differences existed between the combined effects of the variables on the academic outcomes. The focus of this study was to describe and compare the effects of a type of prekindergarten program versus no prekindergarten participation on beginning kindergarten academic achievement. One large school district comprised of eight elementary schools was included in the study. In this chapter, I present the conclusions, based on exploring and translating the results from each of the four hypotheses. Implications of the study are interpreted, and results are evaluated along the continuum of literature. The chapter concludes with a discussion of policy and practical implementations for educational administrators, as well as recommendations for future research.

Conclusions

All four hypotheses were analyzed using a 2 x 2 between groups factorial ANOVA. In Hypotheses 1 and 2, I explored the interaction of the variables of gender and prekindergarten participation on literacy and mathematics achievement as measured by the NWEA MAP Growth assessment. Also, in Hypotheses 3 and 4 I examined the interaction of the variables of ethnicity and prekindergarten participation in literacy and

mathematics as measured by NWEA MAP Growth assessment. To test the null hypotheses, I conducted a between groups factorial ANOVA. The interaction and main effects were examined in each of the four hypotheses. The following hypotheses guided the study, with each hypothesis examined and conclusions determined based on the findings.

Hypothesis 1

The first hypothesis stated that no significant difference will exist by gender between participation in the ABC Prekindergarten Program versus no participation in the program on the literacy achievement measured by the NWEA MAP Growth assessment for students entering kindergarten in a large urban school district in Central Arkansas. Findings revealed no significant interaction between the variables of gender and prekindergarten participation on literacy. When comparing the four means, the mean of the males not participating in the ABC prekindergarten program was the lowest, and the mean for the males participating in the ABC prekindergarten program was the highest on literacy achievement. However, no pairing met the significance level. Therefore, the null hypothesis for the interaction effect was retained. When examining the main effects separately, literacy scores indicated there were no statistically significant differences between the students who had participated in a prekindergarten program and those who had not participated in a prekindergarten program, regardless of gender. The means were also identical between the two groups. Turning to the main effect of gender, males and females scored exactly the same on literacy. Thus, both the main effect null hypotheses were retained.

Hypothesis 2

The second hypothesis stated that no significant difference will exist by gender between participation in the ABC Prekindergarten Program versus no participation in the program on the mathematics achievement measured by the NWEA MAP Growth assessment for students entering kindergarten in a large urban school district in Central Arkansas. Findings revealed no significant interaction effect between the variables of gender and prekindergarten participation mathematics. Examinations of the mathematics scores indicated there were no statistically significant differences between the mathematics scores of students who had participated in a prekindergarten program and those who had not participated in a prekindergarten program by gender. When comparing the four means, the mean of the males participating in the ABC prekindergarten program was the lowest, and the mean for the females not participating in the ABC prekindergarten program was the highest on mathematics achievement. However, no pairing met the significance level. Therefore, the null hypothesis for the interaction effect was not rejected. Upon further examination, the main effect of ABC prekindergarten program participation was not significant. Even though the mathematics achievement scores, on average, were higher for those students who had not participated in the ABC prekindergarten program compared to those who had participated, the difference in the means was not significantly different. However, regarding the main effect of gender, mathematics achievement scores, on average, were significantly higher for females compared to males. Therefore, the main effect hypothesis for ABC prekindergarten participation was retained, and the main effect hypothesis for gender was rejected.

Hypothesis 3

The third hypothesis stated that no significant difference will exist by ethnicity between participation in the ABC Prekindergarten Program versus no participation in the program on the literacy achievement measured by the NWEA MAP Growth assessment for students entering kindergarten in a large urban school district in Central Arkansas. An analysis of the interaction effect between ethnicity and ABC prekindergarten participation was not significant on literacy achievement. Of the four group means, literacy scores, on average, for White students who did not participate in the ABC prekindergarten program were the highest, and scores of the non-White students who did participate in the program were the lowest. However, no pairing was statistically significant. Again, the main effect of ABC prekindergarten program participation was not significant. Even though the literacy achievement scores, on average, were higher for those students who had not participated in the ABC prekindergarten program compared to those who had participated, the difference in the means was not significantly different. However, regarding the main effect of ethnicity, literacy achievement scores, on average, were significantly higher for White students when compared to non-White students. Therefore, the main effect hypothesis for ABC prekindergarten participation was retained, and the main effect hypothesis for ethnicity was rejected.

Hypothesis 4

The fourth hypothesis stated that no significant difference will exist by ethnicity between participation in the ABC Prekindergarten Program versus no participation in the program on the mathematics achievement measured by the NWEA MAP Growth assessment for students entering kindergarten in a large urban school district in Central

Arkansas. The main effect for ABC prekindergarten participation status on mathematics performance was not significant. However, the main effect of ethnicity was significant as well as the interaction effect between the variables of ABC prekindergarten participation status and ethnicity. To better explain the significant main effect of ethnicity, a simple effects analysis was conducted on the interaction of the two variables. Of the four groups created by the combined variables of ethnicity and ABC prekindergarten participation status, the results indicated a significant difference between two of the pairings.

Regarding the non-White students across the two levels of ABC prekindergarten participation status, those students who had no ABC prekindergarten participation scored significantly lower compared to the ABC prekindergarten participation students. In other words, in the two groups of non-White students, those students not participating in the ABC prekindergarten program, on average, scored statistically lower on their mathematics achievement compared to those who participated in the ABC prekindergarten program. Regarding those students not participating in the ABC prekindergarten program across the two levels of ethnicity, the non-White students not participating in the ABC prekindergarten program scored significantly lower compared to the White students not participating in the ABC prekindergarten program. In other words, in the two groups not participating in the ABC prekindergarten program, the non-White students, in general, scored statistically lower on their mathematics achievement compared to their White counterparts. Thus, overall, the results indicated a combined significant effect of ABC prekindergarten participation status and ethnicity on mathematics performance. Therefore, the null hypothesis for the main effect of ABC prekindergarten program participation was retained. However, the null hypotheses for the

main effect of ethnicity and the interaction effect of ABC prekindergarten program participation and ethnicity were rejected.

Implications

The outcomes of this study must be examined within the context of the related literature in the fields of prekindergarten participation, gender, and ethnicity relating to academic outcomes. The results of this study contributed to the mixed results of the studies examined in the review of the literature. However, some of the findings in this study remained consistent with the results of the studies examined in the literature. A large body of research has been generated illustrating academic achievement gaps along economic, gender, and racial/ethnic lines (Chudowsky & Chudowsky, 2010; Egelund, 2012; Klecker, 2006; Reardon, 2013; Reardon, Valentino, & Shores, 2012; Saez, 2012). Additionally, much research, nationally and internationally, has been conducted on the disparities in literacy as reviewed by Reardon et al. (2012) and Stinnett (2014). Previous studies have been conducted identifying factors that influence the education of early childhood learners. This study measured the effect of participating in the ABC prekindergarten program by gender and ethnicity on literacy and mathematics achievement, as measured by standardized assessments. In past years, studies examined academic achievement by various means of assessment. This researcher used the NWEA Map Growth assessments for literacy and mathematics. A comparative analysis of the prekindergarten studies in the literature and the current study was conducted. The similarities and inconsistencies are discussed in this section.

Gender

When taking gender as a main effect variable regardless of their participation in the ABC prekindergarten program, the current study's results indicated no significant difference in literacy achievement. In this finding, females scored very similarly to males regarding literacy achievement. However, the study did produce a significant difference in mathematics achievement. Females outscored males, in general, in mathematics measured by the NWEA Map Growth assessment. Why did males score exactly the same as females on literacy achievement but significantly lower than females in mathematics regardless of prekindergarten participation? It has been thought that females usually outscore males in literacy, and males outscore females in mathematics. Halpern (2000) found that females tend to excel in language production, synonym generation, word fluency, all types of memory, anagrams, and computation. Halpern also contended that males excelled in mathematical problem solving, verbal analogies, mental rotation, spatial perception, and tasks that require visual images. However, Bryant et al. (2003) found that boys scored significantly lower than girls on both reading and mathematics, which support the findings for mathematics achievement in the current study. Because of the mixed results of the literature review, gender was usually controlled in the analyses (Andrews & Slate, 2001; Bryant et al., 2003; Burchinal et al., 2008; Gormley et al., 2005; Janus & Duku, 2007; Mashburn et al., 2008). Mashburn et al. (2008) did not consider gender as an at-risk factor unless it was combined with ethnicity and SES. Janus and Duku (2007) analyzed prekindergarten data and found that males from low-SES households were twice as likely to be identified as at-risk for difficulties with success versus school entry as females.

Ethnicity

When examining ethnicity as a main effect variable, the findings indicated there were significant differences between White students and students of non-White origins on their literacy and mathematics achievement. Findings revealed that non-White students scored significantly lower compared to their White counterparts regardless of their participation in the ABC prekindergarten program. These findings were consistent with the literature review. Researchers have stated that not only are Hispanic and Black students more likely to enter kindergarten less skilled in reading than their Asian and White peers (Reardon, 2011; Reardon & Galindo, 2009), but they are also less likely to pass state exit-level reading assessments (Wright, 2015). Davis-Kean and Jager (2014) analyzed the growth trajectory of students by ethnicity/race as indicated by the 2006 Early Childhood Longitudinal Study-Kindergarten study of 17,565 students. They found that not only were statistically significant differences ascertained in reading achievement levels among ethnic/racial groups, but discrepancies were evident in student growth in reading achievement into the top trajectory over time enrolled in school. In this study, Black students represented the lowest performing subgroup in kindergarten and remained the lowest performing subgroup by Grade 5.

Further, Black readers in the high trajectory reading group performed more like White students in the low trajectory reading group. Davis-Kean and Jager (2014) noted that Hispanic students entered school with lower reading performance compared to White and Asian students. However, a substantial percentage of Hispanic students increased their reading performance across time and finished in the highest trajectory reading group, mirroring that of their White counterparts. Consistent with other researchers

revealing Asian students as top performers among ethnic/racial subgroups (Lee & Slate, 2014; Wright, 2015), more Asian students were in the high trajectory reading group than any other racial/ethnic group (Davis-Kean & Jager, 2014). Closing the ethnic/racial achievement gap and thereby ensuring equity for all students is a goal that still looms in the distance.

ABC Prekindergarten Participation

In this study I examined participation in an ABC prekindergarten program in a Central Arkansas school district. The current study revealed that there was no significant difference in any of the four hypotheses for the main effect of participation in the ABC prekindergarten program on literacy and mathematics achievement for the kindergarten students regardless of the students' gender and ethnicity. Several of the studies in the literature review did not address academic performance but did spotlight other factors. Research conducted in the Perry Preschool Project revealed that participants in their prekindergarten program had fewer arrests during their teen years and into adulthood (Schweinhart et al., 2005). One study indicated participants in the Chicago Child-Parent Center Program had fewer incarcerations (Reynolds et al., 2007). Additionally, the Carolina Abecedarian Project (2014) participants benefited by having a higher-income and had a lower chance of being involved in crime as they grew. All of these studies revealed positive benefits when participating in a prekindergarten program but did not include academic performance in those benefits.

Contrary to this study's findings, Taylor et al. (2000) found that attendance in a preschool program resulted in higher achievement, increased grades, and a lower likelihood of being retained in a grade or placed in special education. Early education

implies a type of care that is responsive to a child's cognitive care (Magnuson et al., 2007). Magnuson et al. (2007) found that attendance in a preschool program significantly increases academic school readiness. In a study from California, significant reading and mathematics gains were made through Grade 3 for children who attended prekindergarten as opposed to those who did not (Gayl et al., 2010). Pratt (1997) argued that high-quality prekindergarten programs produce students who achieve at higher levels and help develop an attitude of life-long learning for the future. Campbell and Ramey (1994) found that school readiness and kindergarten success are increased when children attend literature-rich prekindergarten.

When addressing the combination of ABC prekindergarten participation and gender, no significant interaction effects were found on literacy and mathematics achievement. Therefore, in this study, ABC prekindergarten participation and gender did not combine to influence academic performance significantly. Also, the combination of ABC prekindergarten participation and ethnicity did not significantly affect literacy achievement. The conclusions of this study agreed with the findings of the Jung et al. (2013) study. The researchers used ethnicity as a covariate by adjusting the mean scores for ethnicity. Jung et al. found that there were no significant effects at Grade 4 associated with participating in an ABC prekindergarten program based on ethnicity. However, ABC prekindergarten participation and ethnicity did combine to influence mathematics achievement significantly.

The results of the fourth hypothesis of the current study revealed two main implications. First, of the students not participating in the ABC prekindergarten program, White students scored significantly higher compared to the non-White students in

mathematics. The implication from this finding revealed that the White students in the sample were more prepared for entering into kindergarten and thus gained more from their kindergarten experience in mathematics performance compared to their non-White counterparts. Second, of the non-White students in the sample, those students participating in the ABC prekindergarten program significantly outscored those not participating in the program. Of the non-White students, ABC prekindergarten participation made a significant effect on those students' mathematics performance. Participants in the Perry Preschool Study were African American children from disadvantaged families (Weikart, 1970). The same was true for both the Abecedarian Project and the Chicago Child-Parent Center Program participants. The Abecedarian Project participants were from low-income families and were 98% African American, with 83% of the students in the project being raised by a single mother (Ramey et al., 1984). The Chicago Child-Parent Center Program participants were also from parents who were considered low-income. The participants from the Chicago Child-Parent Center Program were predominantly African American and were considered high-poverty students (Waisman Center, 2014). All of these researchers found that there were positive benefits for African American children when they participated in a high-quality prekindergarten program.

Findings in Light of Limitations

The analysis of this study on the academic achievement of students in kindergarten presented some limitations. First, there was no attempt to control for the non-prekindergarten program participation students. It is unknown if they were enrolled in other programs before entering kindergartens such as private schools, Montessori

schools, head starts, or homeschool programs. Second, because the study was conducted specifically on ABC prekindergarten students in a Central Arkansas school district, there is limited generalizability to the effectiveness of prekindergarten in other areas of the state. Also, the study only examined children attending ABC prekindergarten in the Central Arkansas school district, which limited the study because the ABC prekindergarten itself might not have been sufficient. Research is needed to extend the study to include those children attending prekindergarten in other settings other than the Central Arkansas school district. Research is also explicitly needed on ABC prekindergarten in Arkansas just as it exists for other high-quality state-funded prekindergarten programs in states like Georgia, Oklahoma, and North Carolina.

Another limitation was the maturation; since children attended ABC prekindergarten at the ages of four and five, natural development, exposure to kindergarten curriculum, and other environmental factors may have had an effect of children's readiness for literacy and mathematics academics. Since all children who participated in the study attended kindergarten within the same district that used the same research-based curriculum and pacing guides, the threat was controlled.

It would be difficult to conduct the research using experimental groups; however, this has been done in studies including the Perry Preschool Project (Schweinhart et al., 2005). Andrews and Slate (2001) called for more longitudinal studies and studies that further examine demographic variables, socioeconomic status, and family variables that could influence children's readiness for kindergarten. More experimental research is needed in the field of prekindergarten in order to more accurately examine the effects of prekindergarten has on reading and mathematics readiness and to determine if

prekindergarten in public school is more beneficial than prekindergarten in other settings. The desire for all children to begin school ready to read is at the forefront of educators' minds as there is more and more emphasis placed on accountability. Prekindergarten is one part of the puzzle in preparing children for formal school and creating a more level playing field for all children.

Recommendations

Potential for Practice/Policy

All students deserve an educational experience that prepares them for their short- and long-term futures. Providing high-quality programs should be the standard for all educators. The findings from this study and similar studies may prompt leaders, policymakers, and educational administrators to collaboratively agree on plans to provide high-quality learning experiences to affect students' futures positively. Currently, billions of dollars of federal, state, and local money are being spent on prekindergarten to promote school readiness (Barnett et al., 2012), but there is no guarantee that the prekindergarten is high quality. Furthermore, if prekindergarten programs located within public schools can lead to a stronger connection to the kindergarten curriculum and ease the transition into formal school, more studies need to address how to make high-quality prekindergarten programs effectively help make that transition into formal school. If Arkansas is to continue to fund prekindergarten research, explicitly evaluating the effectiveness of the ABC prekindergarten program is paramount.

If students need a prekindergarten experience to prepare them for future learning experiences, they deserve a high-quality prekindergarten program experience that develops their early literacy and mathematics skills. For some students, these early

learning experiences significantly affect their futures. For some students, success in kindergarten requires the development of foundational early literacy skills that are taught in prekindergarten (Crim et al., 2008; Moats, 1994; Rouse & Fantuzzo, 2006; Scarborough, 2001). High-quality prekindergarten programs have a more significant influence than low-quality programs on developing early literacy skills (Vandell, 2004). If students need a prekindergarten experience to support their learning, the goal should be to provide a prekindergarten program that meets the needs of the children by providing high-quality instruction and classroom experiences that result in the student proficiency in the early mathematics as well as literacy skills.

Future Research Considerations

The findings of this study were limited in scope, and further research is needed to provide educational practitioners with a better understanding of the effects of participating in an ABC prekindergarten program. Therefore, several recommendations are proposed for future study might include the following.

1. Researchers could analyze student data beyond kindergarten to determine if any gains in early literacy and mathematics skills change over the years. This study only examined the kindergarten NWEA scores of a cohort of ABC prekindergarten students from on Central Arkansas school district.
2. Researchers could repeat this study using a larger sample size from various Arkansas school districts and follow students through graduation to see if ABC prekindergarten participation influences academic success beyond the elementary years.

3. Researchers could determine what interventions are most effective, at the prekindergarten level, in helping prepare students for kindergarten.
4. Researchers could consider variables such as grade retention, student attendance, student behavior records, graduation rates, or family structures as dependent variables. These school and family-based variables might allow the researchers to identify factors that could affect student achievement and academic success.
5. Researchers could include and quantitative analyses of ABC prekindergarten and kindergarten teachers' perceptions of their knowledge of early literacy and mathematics skills.
6. Researchers could include qualitative and quantitative analyses of administrators' perceptions and examine the specific professional development offered to aid early literacy and mathematics skills of students. The analyses could focus on the training offered to ABC prekindergarten teachers within the past 3 years, the duration of the professional development, the follow-up training, the resources provided, the timeframe for implementation, and the coaching provisions.
7. Researchers could examine the minimal requirements that constitute a high-quality prekindergarten program. This information would be beneficial in analyzing the effectiveness of the program.

Since it has been written that prekindergarten in public schools could result in more focus on readiness skills and alignment with school curriculum and standards (Conn-Powers et al., 2006), research is needed to determine the effects of public school

prekindergarten as compared to other program locations in the area of reading and mathematics readiness. The development of readiness skills at an early age can be a predictor of future reading achievement (Whitehurst & Lonigan, 1998). Therefore, research in this area would be beneficial for educators to determine the best way to use funds in prekindergarten education. The current research could help provide future quality prekindergarten programs that allow children the opportunity to receive quality instruction and be ready for formal school experiences.

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