The effects of kindergarten entrance age and gender on students' performance on the Ohio Third Grade Reading Achievement Assessment

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The University of Toledo

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A Dissertation

Entitled

The Effects of Kindergarten Entrance Age and Gender on Students’ Performance on the Ohio Third Grade Reading Achievement Assessment

by

Deborah Piotrowski

Submitted to the Graduate Faculty as partial fulfillment of the requirements for The Doctor of Education Degree in Educational Administration and Supervision

__________________________________________
Eileen Carr, Ph.D., Committee Chair

__________________________________________
Gale Mentzer, Ph.D., Committee Member

__________________________________________
Leigh Chiarelott, Ph.D., Committee Member

__________________________________________
Cynthia Beekley, Ph.D., Committee Member

__________________________________________
Patricia Komuniecki, Ph.D., Dean
College of Graduate Studies

The University of Toledo

December 2010
An Abstract of

The Effects of Kindergarten Entrance Age and Gender on Students’ Performance on the Ohio Third Grade Reading Achievement Assessment

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Deborah Piotrowski

As partial fulfillment of the requirements for

The Doctor of Education Degree in Educational Administration and Supervision

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This study investigates whether gender and kindergarten entrance age affect students’ achievement on the Ohio Third Grade Reading Achievement Assessment. More specifically, this study investigates whether kindergarten children with late birthdays (after July 1) and who reside in northwest Ohio score lower on the literacy component of the Ohio Third Grade Reading Achievement Assessment than their older peers with birthdays prior to July 1. The sample for this study is composed of 2,296 third-grade students who attended schools within 10 different school districts in rural northwest Ohio over a three-year period (2007, 2008, and 2009). The sample data consisted of total reading scores, birth dates and gender of the students in the sample. Analysis of the data was conducted using two statistical models: simple linear regression analysis, a series of two-sample t-tests, and a General Linear Model. Overall, the results of the regression analyses indicated a slight negative correlation (not statistically significant) between the age at kindergarten entrance and reading achievement scores, suggesting that the reading
achievement scores for both boys and girls decreases as their age at kindergarten increases. Based on the t-test results, it can be concluded that there is no significant difference in the scores between boys with birthdays after July 1 and girls with birthdays after July 1 on the Ohio Third Grade Reading Achievement Assessment. The General Linear Model analysis indicated there were significant differences between the participating districts.
This dissertation is dedicated to Jim, my late husband, who encouraged me late in life to go back to school to become the teacher I always wanted to be; to my children, Johanna and Catie, who sacrificed “mom time” and attention so I could fulfill a dream; and to John, patient, and supportive—I appreciate what you have allowed me to pursue, and I love and thank you for it.

I would also like to dedicate this dissertation to a special person in my life, Dr. Eileen Carr. Eileen has been with me for most of my life as a professional educator. She has been an inspiration and a most polite taskmaster. Eileen fostered and cultivated my love for literacy and is an exemplary example of someone I would like to be more like. Eileen would not allow me to quit. I would not have completed this task without Dr. Eileen Carr’s confidence in my ability. Thank you.
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Chapter 1

Introduction

Ensuring that every child has access to a free and appropriate education is one of the founding principles of educational democracy. Within the ever-changing educational landscape, the immediate push for more education and better academic preparation required by federal and state government initiatives has created increased pressure on children entering kindergarten who are not prepared for the academic rigors demanded by the current educational system. The increased level of academic accountability, coupled with expanded content demands, has created an environment in which the academic challenges facing young students exceeds what is appropriate for the developmental level of some kindergarten children. As t (1995) has stated, "Children develop at different rates. Some children based on chronological age will not be as able to fulfill schools’ rigorous requirements" (p. 129).

The conflict between what educators deem as appropriate developmental curriculum and legislated standards and requirements has become more pronounced. For example, Lewit and Baker (1995) stated that only 10% of kindergarten teachers thought that it was important for children starting school to know the alphabet. This position is in direct contrast with that of former President George W. Bush, who in 2002—while endorsing demanding, skill-oriented Head Start reforms—stated, "On the first day of
school, children need to know letters and numbers. They need a strong vocabulary...these are the building blocks of learning and the nation must provide them" (Fact Sheet, 2002, p. 1). Bush made his position clear in his speech to legislators, and this marked the beginning of the movement toward more skill-based requirements for school-age children, many of whom were and may not be developmentally prepared to master this content.

According to t (1995), "Historically, chronological age has served as the major criterion for school entry" (p. 130). For example, in the state of Ohio, state law H.B. 383 mandates that "beginning 2001 school district Boards of Education may choose the first day of August or the thirtieth day of September as the date a child must be five years of age to be admitted to Kindergarten" (ODE, 2010, para. 2). This legislation provides a two-month range during which districts can establish cutoff dates to determine kindergarten entrance. Currently, school-entrance cutoff dates vary by district. Varying cutoff dates for school entry adds to the wide range of ages in kindergarten classrooms, resulting in some students entering kindergarten at a younger age compared to their peers. Age is currently the primary factor determining whether children are eligible to enter kindergarten. However, children who are old enough to enter school may lack the skills and abilities to be successful in a formal education setting. In other words, they may not be ready to take on some of the demanding tasks of a kindergarten program.

The problems associated with children’s lack of developmental readiness are compounded even further when legislative pressures force additional content standards into the kindergarten curriculum. Programs such as Race to The Top and No Child Left Behind (NCLB) have become driving forces in determining what is deemed "appropriate"
curriculum content for children entering kindergarten. Frequently, kindergarten students have been detrimentally affected by the requirements of new content-based curriculum (t, Baker; 1995; Deming & Dynarski, 2008). Some children are not ready to delve into heavy content when they enter kindergarten due to their academic developmental level. As a result, these children may be less successful. They may be identified as being “at risk,” pulled out of the regular education classes, or placed in remedial reading programs (e.g., Title I). They also may be identified as candidates for special education programs because they may not be able to keep up with curriculum demands.

Prior to NCLB and other legislation, age at kindergarten entrance had not been considered an important factor in determining qualifications for school entrance. However, age is currently the method schools use to determine kindergarten entrance as a result of state and federal mandates. (Cascio, 2008; Vecchiotti, 2001; Stipek, 2002)

Because the curriculum was broad enough to be developmentally appropriate for all students and students were allowed time to develop academic skills at an individual pace, school success was within reach of all students. Additionally, many districts in Ohio supported developmental kindergarten classes for students who need an adapted curriculum or more time to acquire basic literacy or socialization skills. This researcher found, through her tenure with a district that implemented developmental kindergarten, that the students enrolled in this program were often children with late birthdays (i.e., younger students with birthdays close to the cutoff date). The opportunity for extended learning time and an adapted curriculum afforded these students the chance to acquire the skill base necessary to become successful in a formal school setting. “The knowledge
and skills children acquire in kindergarten and first grade can serve as a foundation for their later educational success” (Rathburn, Hausken, & West, 2004, p. iii).

The developmental kindergarten students in the past have spent two years in kindergarten. The first year was dedicated to working on developing fine motor, socialization, and basic literacy skills. The second year was spent in a traditional kindergarten classroom with a focus on advanced curriculum. Over a two-year period, students who were not initially prepared upon kindergarten entrance were provided with appropriate curriculum and given time to mature and develop foundational skills. Now, regulations have changed the focus of kindergarten, and a demanding curriculum has replaced developmentally appropriate work. Children who are not developmentally ready for kindergarten often lack access to an adapted curriculum and may tend not to develop foundational skills. Therefore, educational success is not as readily available to them.

The federal mandates that were initiated so that all children could receive a free and, more importantly, appropriate education have contributed to current educational inequalities because children who enter kindergarten with late birthdays may not be receiving the appropriate curriculum for their developmental level. Valencia and Wixson (2000) have stated that, while regulatory policy is important, the focus cannot continue to be only on outputs (e.g., student achievement, numbers of students graduating from high school, teacher knowledge, and curriculum alignment). To focus solely on these outcomes would be missing the point of how real improvement in learning is created. In fact, the increasing number of constrictive mandates is one of the primary reasons that some kindergarten students have not received an appropriate education. These mandates
have helped create an imbalance between students' natural stages of development and the educational demands of kindergarten. According to t (1995), "Holding children to a standard also introduces the possibility that children will be judged not ready because of the substantial variability in the rate of normal child development among children of similar ages" (p. 130). Graue (1992) stated that readiness is more than a concept of mere basic academic ability or readiness for school; rather, the concept of readiness reflects society's value system. Society determines what the standards for readiness are.

Because the ability to perform at academically and developmentally appropriate levels is an important part of helping children attain an optimal education, this study was designed to explore the relationship between developmental readiness and performance on tests of academic achievement. The study was also designed to explore the ways that age of kindergarten entry ultimately impacts the curriculum that is taught in kindergarten and the education that children receive.

**Background of the Problem**

Even though the scholarly knowledge base continues to grow and evidence exists to support the important democratic principle of equity in education, efforts to apply the principle of equity have been incomplete. This is particularly true regarding issues that concern the social, cognitive, and emotional development of children entering kindergarten. Several issues have led to educational inequities for some kindergarten students.

The first issue related to educational inequities for kindergarten students concerns a fundamental underlying philosophical shift that has taken place among childcare providers and their clients. Rather than being viewed as a transitional step into the formal
academic environment, kindergarten has more recently been viewed as an advanced preschool with child care. Because childcare has become increasingly expensive and because many children come from homes in which both parents work full time, full-day kindergarten has become a necessary option for many families. McConnell and Tesch (1986) stated that in 1969, only 10% of children were enrolled in full-day kindergarten; however, Bauer (2009) noted that today more than 60% of school districts in the United States offer full-day kindergarten. According to Walston and West (2004), many school districts have implemented a full-day kindergarten to meet the needs of an increasing number of single-parent households (as cited in Bauer, 2009) who benefit from the preparation provided to their children by the full-day care.

Without question, childcare is very costly and has become an important issue connected with education reform. "Before the 1970's 60 percent of all mothers with school age children stayed at home, which allowed the first five years of a child's life to be devoted to free play, pretend games, toys and board games" (Tyre, 2008, p. 57). Children learned how to play, socialize, and follow informal rules—all important skills for learning (West, Denton, Germinio-Hausken, 2000 & 2004; NICHD, 2007). As economic difficulties have increased nationally, families, many with young children, have also experienced increased stress. These children often have been enrolled in kindergarten as soon as possible as a means of deferring the high cost of childcare. The youngest kindergarten children often are less developmentally ready to undertake academic tasks then their older peers (Rathbun, Hausken, & West, 2004). While postponing entrance into school could help children with birthdays after July 1 who are developmentally unprepared for the rigorous standard-based curriculum, the economic
burden on many parents does not allow for these students to be placed in costly child care or pre-school programs. The only choice for them is to enroll their children in kindergarten.

A second issue that has led to inequity in kindergarten education is the political context in which kindergarten developed. The education system in the United States historically has been politically driven. Examples of restructuring education to meet demands of a changing society have been noted nationally in Eisenhower's National Defense Education Act of 1958; Kennedy's New Frontier in the 1960s; Johnson's Great Society; and, more importantly, the Elementary and Secondary Education Act (ESEA) of 1965. States have followed suit. In his 2009 State of the State address, Ohio Governor Ted Strickland pledged his commitment to all-day kindergarten in Ohio ("State of the State," 2009, para. 87). Education was a strong political platform for Governor Strickland, who has been very aware of the financial strife within the state and the need for more comprehensive educational programs to prepare Ohio's school children to meet 21st-century federal mandates. As a result, school eligibility requirements (i.e., cutoff dates for birthdays) have played an increasingly important role in kindergarten enrollment. Specifically, children with birthdays after July 1 can enroll in kindergarten, but many who are not developmentally ready are faced with the probability of academic failure as they begin school. These children, by enrolling in a free public school kindergarten, may not have the luxury of additional time in a childcare facility or pre-school to develop their skills naturally and sequentially before enrolling in kindergarten (Walston & West, 2004; Bauer, 2009).
States and school districts receive an enormous amount of federal dollars and have become dependent upon these funds as part of their operating budgets. Therefore, districts must comply with federal and state mandates, including curriculum mandates. Although the mandates may not best serve the needs of students, including the youngest students, states and school districts nevertheless must adhere to the stipulations connected to the funds. However, mandated stipulations and changes in legislation are not always tightly linked to developmentally appropriate practices. Frequently, legislative changes represent a significant departure from the original, foundational principles of a developmentally appropriate kindergarten. The shift in recent years has moved away from a developmentally appropriate kindergarten to a more content-centered one.

One example of this shift toward a more content-centered curriculum is the passage of the No Child Left Behind (NCLB) Act. In many respects, the NCLB is actually a revised version of the Elementary and Secondary Education Act (ESEA), reauthorized once again with added levels of accountability attached. The original intent of the ESEA was noble. It focused on serving the needs of all students and fostered programs such as Head Start. Additionally, the ESEA also required increased professional development for teachers and Title I support for programs in districts with a high percentage of lower socioeconomic status students. These are positive aspects of this Act. However, one problematic issue with the ESEA was the requirement of full compliance; therefore, if a district did not comply with the Act in totality, it did not receive program funding. Therefore, states had to adhere to all the required standards, including a high-demand kindergarten curriculum. In addition, while the intent of the ESEA reflected democratic principles, the system of monitoring the programs was poor
at best. Again, the government stepped in and amended this legislation in 1966, 1967, 1969, and 1972 in order to obtain more control over the type, quality, and recipients of the instruction. These amendments strengthened the government's control over educational reform.

A third issue that has led to inequity in kindergarten education can be seen in the historical evolution of kindergarten. Friedich Frobel envisioned kindergarten as a place where young children would grow "physically, socially, and spiritually" (Shapiro, 1983; Bauer, 2009). This vision was the foundation for many early kindergarten programs. To some extent, this model is still practiced in eastern Asian countries. However, the emphasis on content-based learning in United States kindergarten programs changed the more holistic, developmentally appropriate focus of the past. In 2002, Graue (1992) stated, "Readiness is more than a concept of mere basic academic ability or readiness for school. Rather, the concept reflects society's value system and is dependent upon social consensus about the meaning of schooling" (as cited in Kim, 1992, p. 2). The U.S. has historically compared its educational achievements with countries in the Middle and Far East. Now, the United States does not follow the same early preparation programs as its Asian counterparts. According to Shim and Lee, many Korean parents and teachers feel it is important for early childhood education to teach children that kindergarten is a time to improve their self-esteem and creativity rather than learn specific academic skills (as cited in Kim, 2002). This holistic development concept may have provided opportunities for young children in the United States to complete kindergarten successfully, without failing to achieve "scholastic" expectations. However, with high-stakes testing being
mandated within NCLB the holistic model of learning for kindergarten children is not a common practice due to the adoption of NCLB philosophical underpinnings.

**Statement of the Problem**

According to a variety of studies (Bisanz, Dunn, & Morrison, 1995; Breznitz & Teltsch, 1989; Davis, Timble, & Vincent, 1980; Diamond, 1983; Dipasquale, Moule, & Flewelling, 1980; Langer, Kalk, & Searls, 1984; Maddux, 1980, Uphoff, 1985), a positive correlation exists between kindergarten entrance age and overall performance in school. When students are in the older spectrum at kindergarten entrance, research has shown that they usually do better academically. These findings have encouraged many parents to hold back children with birthdays close to school cutoff dates so they will be better prepared to be successful in school. Because students enter kindergarten at very different ages and have different abilities, they often receive substantially different treatment.

Research has shown that those who are better prepared academically (often older students) experience significant advantages over other less prepared students, particularly in urban school districts. This has resulted in several problematic concerns: First, the impact of age at kindergarten entrance on reading development in rural school districts is unclear. Secondly, the impact of age at kindergarten entrance in rural school districts on reading development among boys and girls is also unclear. And finally, because older students are often better prepared than younger students, younger students may require a more detailed curriculum. As a result, the current practice of using age as the determining factor for kindergarten eligibility may not be the best practice as it may result in obstructed progress toward the admirable goals and outcomes that these systems were designed to achieve.
Purpose of this Study

The purpose of this study is to investigate whether the age at kindergarten entrance affects achievement on the Ohio Third Grade Reading Achievement Assessment. More specifically, this study investigates whether kindergarten children with late birthdays (after July 1) and who reside in northwest Ohio score lower on the literacy component of the Ohio Third Grade Reading Achievement Assessment than their older peers with birthdays prior to July 1. This study also investigates whether boys with late birthdays (after July 1) score lower on the literacy component of the Ohio Third Grade Reading Achievement Assessment than do girls with late birthdays (after July 1).

Rationale

Limited research has been conducted on the relationship of the age at which students enter kindergarten and the impact that it has on children's performance on the literacy component of the mandated third-grade reading achievement test. Students who are enrolled in kindergarten and have birthdays after July 1 may be disadvantaged in two ways. First, they may be challenged beyond their abilities in ways that violate commonly established principles of cognitive development. Secondly, they may receive unequal instructional treatment—different from their older counterparts—because they are viewed as not being able to perform the same literacy tasks. As educational theories and practices come under increasing scrutiny, more specific evidence is needed to guide and support efforts to increase educational equality by differentiating and scaffolding instruction for students who are less academically prepared than their peers. The results of this study can potentially provide just such specific evidence.
Research Questions

**RQ1.** Is there a relationship between the age at which children in rural northwest Ohio school districts enter kindergarten and their scores on the Ohio Third Grade Reading Achievement Assessment?

**RQ2.** Do boys entering kindergarten from rural northwest Ohio whose birthdays occur after July 1 perform lower on Ohio Third Grade Reading Achievement Assessment than girls with birthdays after July 1?

Significance of the Study

The significance of this study is reflected in two primary domains: First, the results of this study could reveal ways in which age at kindergarten entrance impacts student achievement in later years. More specifically, findings may influence (1) the methods by which school districts develop curriculum to address the needs of kindergarten children with late birthdays, (2) the type of professional development and support that school districts offer teachers to facilitate appropriate learning opportunities for these students, and (3) the types of interventions that school districts develop to assist these students in establishing a stronger literacy base and better prepare them for standardized testing.

Secondly, the results of this study may impact legislative efforts aimed at creating more balanced and equitable policies that ensure all students receive appropriate and individualized educational opportunities. In response to this study, legislation may be enacted which recognizes that not all students are developmentally ready to perform within the current curricular framework that federal legislation deemed appropriate. For example, students enter kindergarten with many different levels of academic
preparedness. Some students are not developmentally ready to grasp difficult literacy tasks. As a result, after being unable to catch up with their more advanced peers, these students are often placed in costly intervention programs. Eventually, they may drop out of school; have low paying jobs; seek public assistance; or, at the further end of the spectrum, become incarcerated (Slavin, Karweit, & Waski, 1992, p. 2; Tyre, 2008).

**Definition of Terms**

*Childhood development.* How a child develops both psychologically and biologically between the time of birth and adulthood.

*Culture.* Refers to characteristics that are commonly shared, such as values, attitudes, practices or a set of beliefs.

*Cut score.* A score on a test that classifies test takers into different groups. On the Ohio Third Grade Reading Achievement Assessment, the cut score categories are below basic, basic, proficient, advanced, or accelerated.

*Kindergarten.* Refers to a child's first mandated, formal education experience at age five.

*All-day or full-day kindergarten.* A kindergarten program where students who are five years old before the district cutoff date of their kindergarten year attend school for more than four hours per day, Monday through Friday.

*Half-day kindergarten.* A kindergarten program where students who are five years old before the district cutoff date of their kindergarten year attend school for less than four hours per day, Monday through Friday.

*Literacy.* The ability to read, write, and use language to communicate in an age-appropriate and developmentally appropriate manner.
Ohio Third Grade Reading Achievement Assessment. An Ohio mandated standardized test that measures a student's proficiency in vocabulary, non-fiction text, fiction text, grammar, and spelling. This test is given in the fall and spring of the third-grade year. The "proficient" score indicates that a student has passed the test and met Ohio standards.

Rural An area outside city limits which is often mainly composed of farmland or agriculture. An area where there is more land than houses per square mile.

Social equity. The concept that all classes of persons are equal and have access to the same opportunities and educational services.

Success indicators on the Ohio Achievement Test. The rating categories of "proficient," "advanced," or "accelerated" describe students' performance on the Ohio Achievement Test.

Zone of Proximal Development. Vygotsky's term which refers to the range of abilities a child/adult is able to perform with assistance.

Assumptions

The researcher made the following assumptions while conducting this study:

- All teachers followed the appropriate achievement testing guidelines when administering the Ohio Third Grade Reading Achievement Assessment (e.g., administration rules, time limits, scoring when needed), ensuring data validity.

- Each student performed to the best of his or her ability on the assessments.

- The research results can be extrapolated to rural school districts.
Nature of the Study

This study employs quantitative research methods to examine the effects of the relationship between age and gender on Ohio Third Grade Reading Achievement Assessment scores. To preserve anonymity, no specific information on individual students was collected. The only information collected consisted of the student test scores, which are linked to a student identification number.

Summary and Organization of the Remainder of the Study

This dissertation consists of five chapters. Chapter 1 is composed of the following sections: the introduction, the problem statement, the purpose of the study, the underlying rationale for conducting the study, the research questions to be addressed, the significance of the study, the underlying assumptions that inform the study, the nature of the study, definitions of important terms, and a description of the organization of the remainder of the study. Chapter 2 reviews information from research literature found in scholarly peer-reviewed journals and other credible sources that establishes a clear context for this study. It defines child development and its link to federal mandates; outlines the history of kindergarten in the United States; and illuminates child and literacy development and the differences of age and gender on academic success. Chapter 3 explains the methodology of this study. It presents the research design and describes the sample, the instrumentation, and the data collection procedures. Chapter 4 presents the results of the study. Chapter 5 summarizes the results of the study, provides possible explanations for the findings of the study, and presents implications for action, identifies limitations of the study, and provides recommendations for further research.
Chapter Two

Literature Review

Because early childhood development is a comprehensive topic, the sections in Chapter 2 are presented in an order that reflects the developmental stages of children from birth to the time they enter formal schooling. Chapter 2 begins with a discussion of the theories of childhood development, including subsections on environmental factors, biological/neurological factors, and emotional factors that influence childhood development. The chapter continues providing discussions on a series of topics focusing on influences that impact the age at which children typically enter kindergarten. These sections include Vygotsky’s Zone of Proximal Development, literacy development skills, the purpose of kindergarten, political influences on kindergarten curriculum, parental factors that influence kindergarten enrollment, and teacher attitudes. These sections provide background information that, as a whole, suggests additional information is needed about the differences in age at which children enter kindergarten and the impact that these age differences play in literacy development between boys and girls.

Conceptualization of Child Development

Many theories have been proposed that describe and explain the processes related to how children develop. Piaget (1972) believed children develop within developmental frameworks, and within each framework, a specific age is associated with the ability to
accomplish particular tasks. Other theorists, such as Vygotsky (1978), believed that children's culture and experience play an important role in determining how and when children acquire knowledge. Vygotsky also believed that the interaction and hands-on experience that children encounter under the guidance of a more experienced person provides them with opportunities to acquire new knowledge. He suggested that children learn new tasks through scaffolding, learning appropriate tasks a little at a time, developing knowledge incrementally, and building on that knowledge. Logically, children bring many different experiences from their culture and personal history into classrooms. Combined experiences are, in fact, the foundation of learning. In response, educators typically build on individual experiences by scaffolding behaviors that reflect an appropriate hierarchy of learning for each child. In other words, all children develop, but not all children develop equally across content areas because of differences in social interaction, culture, and genetics (Vygotsky, 1978). These differences enable some children to advance cognitively, socially, physically, and emotionally at a faster rate than other children.

The events that children experience during the first months and years of life play an important role in their development, not because this period of development provides an indelible blueprint for adult well being but rather because it sets either a sturdy or fragile foundation for what will follow (National Research Council Institute of Medicine, 2000). According to the National Research Council Institute of Medicine (2000) in its landmark research study From Neurons to Neighborhoods, 10 principles shape the development of young children from birth to age five (the approximate age at which most
children begin kindergarten). Of those 10 principles, the following four are relevant to this literature review:

1. Human development is shaped by a dynamic and continuous interaction between biology and experience.

2. Culture influences every aspect of human development and is reflected in child-rearing beliefs and practices designed to promote healthy adaptation.

3. The timing of early experiences can matter, but, more often than not, the developing child remains vulnerable to risks and open to protective influences throughout the early years of life and into adulthood.

4. The course of development can be altered in early childhood by effective interventions that change the balance between risk and protection, thereby shifting the odds in favor of more adaptive outcomes.

Of these 10 principles, perhaps the most important is that "human development is shaped by a dynamic and continuous interaction between biology and experience" (National Research Council Institute of Medicine, 2000, p. 3). Psychologists refer to this concept as "reciprocal determinism" and usually associate this and related concepts with brain plasticity. Brain plasticity is the ability of parts of the brain, specifically the cerebral cortex, to compensate for deficiencies in other areas of the brain. This occurs most frequently when one area of the brain has been injured. Plasticity refers simply to the ability or capacity of the brain to reorganize its functions in response to an event.

However, while this is normally a genetic modification, plasticity or reorganization typically occurs when there is a change in the environment of a child.

According to a team of experts with the National Research Council Institute of
Medicine (2000), there is greater brain plasticity in early childhood development than in later stages of development. This brain plasticity associated with neurological development represents one of the cornerstones upon which this research study has been conceptualized. Neurological development sets the parameters for how children learn, what they are able to learn, and how best they learn. When children become old enough to enter kindergarten, their neurological structures are still fragile and developing.

Placing children into an academic environment for which they may not be ready can cause irreparable damage along a variety of important life dimensions—e.g., emotionally, physiologically, socially, and developmentally. It is not always evident to educators and policy makers, but the age at which children enter their first formal educational environment can set into motion a series of events that can have long-lasting consequences. As a result, it is important to understand the components of child development—biologically, socially, and emotionally—and how these components play a role in the academic experience of children upon entrance into kindergarten.

**Biological and Neurological Factors**

One important consideration in early childhood education is the way that children differ biologically and neurologically. Some of the neurological differences include differences in the brain's blood supply, its cellular (glial) support systems, its intercellular insulation (myelin), the neurochemicals that are produced, and the specific receptors that recognize each individual substance (National Research Council Institute of Medicine, 2000). *Glial* is a Greek word that translates roughly to "glue." Glial cells, like glue, act as an adhesive and are responsible for providing support and protection for the brain's neurons. Glial cells hold the neurons in place, supply the neurons with nutrients and
oxygen, stave off pathogens, and monitor neurotransmissions. Neurons are responsible for processing and transmitting information by electrical and chemical signaling. If some children's brains have developed fewer glial cells, their brains will naturally contain fewer neurons to process and transmit information. If there are fewer transmitters, then some children's brains may not have the ability to process outside stimuli and information at the same rate as children with more glial cells. Therefore, not only have biological, and environmental factors been implicated in research related to the age of kindergarten entrance, perhaps more importantly, so have neurological factors. As a result, children, especially younger children, may not be prepared to compete with students who are biologically and neurologically more advanced. Consequently, these younger children can be placed at a tremendous disadvantage when entering a more content-based kindergarten.

In addition to recent findings related to developmental differences based on children’s ages, recent longitudinal research conducted by the National Institute of Mental Health (NIMH) (2006) has suggested that various regions of the brain develop in different sequences and at different tempos in girls compared with boys. This research determined that the parietal gray matter of girls’ brains develops approximately two years ahead of the parietal gray matter in boys’ brains. This region of the brain is responsible for integrating information from different sensory modalities, which may account for the reason that many young girls are better able to assess a situation and react in a more socially acceptable manner in a classroom or social setting. In addition, the occipital gray matter, or visual cortex, develops more rapidly in girls between six and ten years old than in boys of the same age. This may indicate one reason girls find reading a more
pleasurable activity and develop literacy skills more quickly. The NIMH study found that the language areas within the brains of five-year-old boys closely resemble those of three-and-a-half-year-old girls. This research strongly suggests that boys who have birthdays after July 1 may be at a greater disadvantage in acquiring the requisite literacy skills if the language centers of their brains are not developing as rapidly as those of girls (Boys Adrift, 2007). This suggests that boys may be at a developmental disadvantage in acquiring literacy skills when compared to girls. Boys who have birthdays after July 1 may be at an even greater developmental disadvantage in acquiring the necessary literacy foundation in today's content-driven kindergarten classrooms. This also may explain why biological and neurological development would make a difference in knowledge acquisition, especially literacy acquisition, and suggests that there may be a disparity between the developmental stages of girls and boys.

**Environmental Factors**

In addition to the important role that biological and neurological factors play in determining when children are most well suited to enter kindergarten, environmental factors also influence how children experience the educational process and acquire literacy skills. “There is ample documentation in this literature of early environmental influences on concurrent cognitive development and, in some cases, on later learning” (Neurons to Neighborhoods, 2000). In addition, research from Early Child Care Research Network in 2000, states that a child’s home environment accounts for the biggest variation in what children know and are ready to learn upon kindergarten entrance. With the variations in a child’s environment as noted above, each child therefore comes into kindergarten with different skills which are acquired, in part, based
on the environment from which they came. Educators, by standardizing curriculum, have by implication suggested that all children are developmentally equivalent. All students are treated as though they have come to school with the same skill set and that they have advanced within the same approximate time frame. Naturally then, when children are tested, the assumption is that they all must perform at a similar academic level and that they should come to school prepared to learn what policymakers have mandated as appropriate and "standard." However, this approach is not consistent with prevalent research in child development, which suggests that the development of children unfolds along individual pathways, the trajectories of which are characterized by continuities and discontinuities as well as by a series of significant transitions (National Research Council Institute of Medicine, 2000).

Explanations both by Vygotsky and the National Research Council Institute of Medicine assert that children’s environment and culture have a tremendous impact on their development. For example, the authors of the National Research Council Institute of Medicine report (2000) have written the following: "No two children share the same environment and no environment is experienced in exactly the same way by two different children" (p. 24). This suggests that developmentally, no two children will bring the same history or background experiences with them when they enter kindergarten. Instead, children come to kindergarten ready to learn at their own individual levels of development. If this is true, then children who have birthdays after July 1 may not have had the same opportunities as other children because they have had less time to create and integrate experiences, build a knowledge base, and develop their cognitive and social skills. These environmental factors—i.e., cultural and social interactions—make a
difference in determining whether children are ready to meet the demands of a kindergarten curriculum since children's interactions with their environment vary greatly.

**Emotional Development**

In addition to biological, neurological, and environmental factors, emotional development can also be considered an important developmental factor. Kindergarten teachers expect children to perform certain tasks, such as listening while directions are being given, staying on task for a specific period of time, coping effectively while separated from their care givers, playing with others, and sharing, to name a few.

Children who may not be able to perform these tasks may not be emotionally prepared for kindergarten or the formal school setting because they have not developed the emotional capabilities to handle these challenges.

Sometimes, children are unable to express their feelings in a way that is acceptable in a formal school setting. If children have not developed to an extent that enables them to display age-appropriate behaviors or regulate their emotions, they may be at risk of being labeled as behaviorally challenged, or they may form a negative attitude towards formal education. Casual observation in many academic environments has suggested that boys can be observed as more active, physical, and aggressive than girls, especially in the pre-school and kindergarten classrooms. These behaviors represent a natural course of development in males and a way in which males express their feelings. Boys communicate more by bumping, pushing, and running, with less eye contact and verbalization than girls. According to Gurian (2003), "The male brain and chemistry impel males to practice less empathy and more challenge" (p. 55). This behavior may result in more male students being labeled as emotionally unprepared for
school or hinder their ability to conform to classroom rules and expectations. However, children who are emotionally able to perform within the specifications of a kindergarten school setting by not being disruptive in class, communicating their needs, and being sensitive to their classmates feelings, have been shown to receive positive feedback, develop positive peer relationships, and have a more positive school experience by being ready for school (, 1995). When children have positive experiences, they are more willing to perform required and requested tasks and may be more open to new experiences and successes within the classroom setting. Emotional competence has figured prominently in the prediction of children's success in first grade and can also play a role in future success as well (Pianta, 2006; Agostin & Bain, 1997).

Upon entering a formal school setting, children may experience trepidation and fear of the unknown. Each child, due to his or her unique environment and cultural background, will react differently. Some children, due to their environment, may experience severe anxiety or anger at being in an unfamiliar environment. Other children may be withdrawn and shy. The fear of the unknown may illicit different emotional responses that affect children's abilities to concentrate, focus, and learn. "High levels of negative emotional arousal are associated with difficulties attending to and retrieving information,” which is a necessity in acquiring literacy skills (Pianta, 2006, p. 124; Lench & Levine, 2005; Tomaka, Blascovitch, Kelsey, & Leitten, 1993). Children who are considered to be "a young five years old" may be more at risk of becoming emotionally unstable in a formal classroom setting and at a risk of not having the ability to learn due to higher level of anxiety or anger as a result of being placed in an unfamiliar setting.
Children enter schools with a variety of different experiences, social skills, and cultural and emotional differences, yet they are still expected to attain the same level of academic achievement. Before children enter kindergarten, they have been influenced by a variety of developmental factors—e.g., neurological, environmental, social, and emotional—resulting in a wide variety of differences in skills and abilities. These differences manifest themselves in a variety of performance measurements, such as readiness assessments, motor skills inventories, and standardized tests. Vygotsky's theory of the Zone of Proximal Development (ZPD) takes into account these developmental factors children bring to the learning environment. As a result, it is not surprising that Vygotsky’s theory of ZPD contradicts the widespread use of standardized testing to measure or determine intelligence. Rather, he suggests that intelligence should be measured individually and through observation. From observation, one can learn how children's problems can be solved when they work with the assistance of someone who has mastered the concept they are attempting to learn. His theory of cognitive development is based on the importance of social interactions in learning. Vygotsky (1978) believed that social learning supports development and that children's cultures have a great impact upon cognitive development. Because children entering kindergarten do not have the same collection of background social interactions, their propensity for cognitive growth is not equal. Because of this inequality, due in part to environmental factors beyond their control, children naturally have different cognitive knowledge bases. Thus, children entering kindergarten who are tested at the same level will not produce the same test results. Those students with fewer supportive social interactions and a
limited knowledge base will not perform as well on kindergarten screening assessments as those students with a more complete knowledge base.

Because of this discrepancy, Vygotsky emphasized that language acts as a catalyst for children’s cognitive development, and therefore, if children experience limited social interactions, their language development will not be as advanced as those children who have come from an environment rich in social interactions. Children with limited social interactions will not perform at the same level as their peers who are entering school more prepared. Therefore, based on existing research, it seems reasonable to conclude that the individual needs of many young children are not being addressed in kindergarten classrooms (National Research Council Institute of Medicine, 2000). As a result, one of the questions facing educational researchers today is not whether early experience matters but rather how early experiences shape individual development and contribute to children’s continued movement along positive pathways (National Research Council Institute of Medicine, 2000, p. 6).

**Vygotsky's Zone of Proximal Development**

Vygotsky has explained that the Zone of Proximal Development is the distance between the actual developmental level (as determined by independent problem-solving ability) and the level of potential development (as determined through problem-solving ability under adult guidance or in collaboration with more capable peers). The application of the theory of the Zone of Proximal Development within the classroom setting suggests that teachers must scaffold their instructional strategies to meet the needs of each student. As a result, teachers must (1) be aware of the cultural background of
each student, (2) know where or in what context children have "learned," and (3) make those connections to each child and to the curriculum.

Children come to school at different developmental levels and have varied levels of understanding about concepts in each content area. Their strength or deficiency in knowledge, according to Vygotsky, (Mind and Society, 1978) has a direct relationship to the environment in which children's initial development takes place. Children must possess the ability to solve problems independently and develop knowledge or skills through scaffold support if learning is to continue. If some children's actual development is not as advanced as others, they will necessarily require more support. This equates to more time spent learning with the assistance of a knowledgeable person. Time to work with children individually is limited when teachers are required to teach a broad standards-based content. Children who need and do not receive adequate time, support, or scaffolding from an experienced teacher often will not develop knowledge or skills as rapidly as their peers. Children who are not at the same level as their classmates are then placed in remedial programs or special education programs due to failing grades.

Within the theory of the Zone of Proximal Development, one of the most important characteristics is the type of interaction with a person who is more knowledgeable about the specific task being learned. This person must be able to scaffold student learning to a higher cognitive function. Vygotsky believed that children are born with very basic parameters for their cognitive and intellectual development and refers to them as "elementary mental functions." These functions include attention, sensation, perception, and memory. Elementary mental functions can only develop through interaction within the "socio-cultural environment," and they serve as a base for
developing the higher mental functions. Higher mental functions result from being taught culturally specific mediators by the teacher or by one who has attained a higher knowledge level. Vygotsky (Mind in Society, 1978) suggested that language development, including writing things down as a way to develop problem-solving skills, served as a bridge between elementary and higher mental functions. Therefore, teachers need time to determine each child's Zone of Proximal Development to design an appropriate curriculum or content that bridges known information with new or unlearned information.

Language is an important link to the acquisition of higher mental functions, and students with birthdays after July 1 may be at a disadvantage in their use of language for communication. More specifically, younger kindergarten boys may be at more of a disadvantage than younger girls. For example, "Girls tend to be more verbal. Females learn to speak earlier and learn words faster. At 18 months boys' vocabularies generally range from zero to 220 words, while girls' vocabularies generally range from 2 to 318 words. At twenty-four months, a girl's average vocabulary is 40 percent greater than a boy's" (Tyre, 2008, p. 65). Boys with birthdays after July 1 may be at a greater academic disadvantage than their female peers because research has demonstrated that their vocabulary is far below that of their female counterparts. With language skills below their female counterparts, boys are less prepared to acquire the literacy skills that have been identified and mandated through the Ohio kindergarten curriculum.

Vygotsky suggested that writing in our culture can be considered to involve higher mental functions. Students with birthdays after July 1 may not be developmentally able to engage in this function because of the level of fine motor skills
required to write. These students may not be prepared to write because they may not have had socio-culture exposure to writing. This skill has more to do with children’s developmental stage than their ability to understand content. As with literacy acquisition and its relationship to language, writing depends on fine motor skills. Students, especially those with birthdays after July 1, may be less able to hold a pencil, form shapes, write letters, or write their first and last names. Instead, they may be in the "scribbling" stage of prewriting and unable to utilize writing as a higher mental function to express their thoughts. Because of their developmental stage and level, these students will require time and extra scaffolding by their coaches or teachers to advance from the stage of scribbling to writing. This inequity stigmatizes young students who are eager to please yet unable to perform the task.

In a study from 1971-2004, the U.S. Department of Education found that boys start far behind girls in writing and never catch up. "The gap between elementary school females and males, which was 16 points in 1998, grew to 17 points by 2002. The difference between males and females in high school writing grew from 19 to 24 points" (Tyre, 2008, p. 26). Children, according to Vygotsky, come to us in school at many developmental levels due to functions genetically inherited. However, higher mental functions involved in working, are developed through social interactions, at home and through formal education. When kindergarten is content driven those students who are developmentally behind their peers are not as able to acquire the higher mental functions as rapidly as their peers and may lag behind throughout their years in formal education.

The gap between the two levels of achievement may not be one that will be expeditiously closed. In today's kindergarten classroom, there are time limits placed on
instructors for teaching specific concepts. Students who are not able to grasp concepts quickly often are labeled as the students who are "developmentally lagging" and, as a result, are then placed in remedial programs referred to as "pull-out" settings. Instead of receiving more instruction and guidance within their individual Zone of Proximal Development, these children are often pulled out of class instruction. They ultimately fall behind classmates and are more prone to experience a poor self-concept, believing that something is different about them. They may be categorized as being "slow" to acquire content skills and perceived by other students as not fitting in. These are crucial points when considering the need children have to belong and please during this stage of development.

Vygotsky’s theory of the Zone of Proximal Development links well to how literacy is acquired in young children. Children come to school with different elementary mental functions. These elementary mental functions (attention, sensation, perception, and memory) are the base for developing higher mental functions. Higher mental functions cannot be acquired without being taught by the teacher or one who has attained a higher knowledge level. Literacy development follows the same premise. Children come to school with various exposure to literacy. A teacher must recognize this and bridge a child’s present skill to a higher level, whether that skill is identifying letters, letter sound association, rhyming, and word recognition, or making words from word families. In this way, students who have not yet developed a skill will be guided to a higher knowledge level with more skill acquisition and ultimately become skilled in reading.
Literacy Development Skills

Because children encounter a variety of different developmental influences, they do not bring the same literacy skill sets to kindergarten, resulting in different ability levels. In line with Vygotsky’s principles, the acquisition of literacy is very dependent upon children’s experiences in their environment and their natural development. The idea of development is used extensively to give order and meaning to changes over time in children’s physical, cognitive, psychosocial, and moral development. Development provides the rationale for a variety of practices and policies related to children (Cahan, 2008). Within children's environments, actions as simple as turning the pages of a book from right to left, holding a book independently, pointing to print from left to right, and looking at pictures are necessary sequential skills required for emergent literacy to develop. These skills require children to have acquired some motor skills, sit for a certain period of time, and focus their attention on the task at hand.

Researchers such as Piaget and Vygotsky have determined that physical and motor development take place over time. Perhaps more importantly, physical and motor development occurs at different rates for different individuals. Development is based on a variety of social, environmental, physiological, and psychological factors. Literacy development, however, is not as easily observable. It also varies according to a variety of social and economic factors, and it develops over time. Despite the idiosyncrasies known to be associated with the learning process, government policy makers have established a checklist of literacy skills prepared by The National Institute for Literacy (2006) that all students should have acquired upon entry into kindergarten. The checklist supports the foundations of literacy that are expected in a formal school setting, but it does not take
into consideration children's varied experiences and physical development. While the checklist is basic, students are expected to have acquired these skills before entering kindergarten. A sample of the skills on the checklist is presented below:

- My child knows the shapes and names for the letters of the alphabet and writes many uppercase and lowercase letters on his own.
- My child knows that spoken words are made of separate sounds.
- My child recognizes and makes rhymes, can tell when words begin with the same sound, and can put together, or blend, spoken sounds.
- My child can sound out some letters.
- My child knows that the order of letters in a written word stands for the order of sounds in a spoken word.
- My child knows some common words, such as *a, the, I,* and *you,* on sight.
- My child asks and answers questions about stories and uses what she already knows to understand a story.
- My child knows the difference between "made-up" fiction and "real" nonfiction books and the difference between stories and poems.
- My child uses what he knows about letters and sounds to write words.
- My child writes some letters and words as they are said to her and begins to spell some words correctly.
- My child writes his own first and last name and the first names of some friends and family.

Although these skills are necessary for literacy acquisition, it is not likely that all entering kindergarten children have had the exposure to, are interested in, or able to
perform what seem to be simple tasks for literacy acquisition. Shanahan (2007) has confirmed that while the checklist above may seem to be simple, "literacy is complex and requires the integration and coordination of many cognitive, perceptual, and linguistic skills and abilities" (2007, p.1) Shanahan has further stated that certain "precursor" skills have strong to moderate correlations with later decoding, reading comprehension, and spelling. Those precursors of literacy acquisition include the following:

- **ABC Knowledge**: Ability to name and provide sounds for randomly presented letters.
- **Phonological Awareness**: Ability to perceive, manipulate, or analyze the sound structure of oral language independent of meaning, including the ability to distinguish or segment words, syllables, or phonemes.
- **Concepts about Print**: Knowledge of print conventions and concepts, such as directionality and the distinction between pictures and text.
- **Rapid Naming**: The ability to produce or comprehend spoken language, including vocabulary or listening comprehension.

While this may seem to be simple, the ways that children approach mastering the precursors depend a lot upon their developmental stage. As with Vygotsky’s Zone of Proximal Development, children’s age and environments provide the background knowledge they need to be prepared for a content-based kindergarten classroom. This list accurately includes literacy skills that are necessary when children enter kindergarten, but it does not inform parents about how to prepare their children for kindergarten literacy, nor does it elaborate on information that is critical for legislators to know regarding what must happen at home and in early kindergarten to prepare every child for what is now a
very rigorous content-based curriculum. Young children with birthdays after July 1 may not be developmentally prepared to function successfully in kindergarten based on their developmental level and not necessarily on their ability.

In addition to the skill set described by the National Institute for Literacy (2006), the State of Ohio has developed "benchmarks" and "indicators" (1987) for each grade level to guide K-12 teachers to assist their students in becoming successful on state-mandated tests. For kindergarten, while broad in nature, the benchmarks mirror what the National Institute for Literacy recommends that parents of children in kindergarten should know. The benchmarks for K-3 and corresponding kindergarten grade-level indicators for the particular benchmarks, from the Ohio Department of Education, 1987, are as follows:

- Establish a purpose for reading and use a range of reading comprehension strategies to understand literary passages and text. (Visualize the information in texts and demonstrate this by drawing pictures, discussing images in texts or dictating simple descriptions.)

- Make predictions from text clues and cite specific examples to support predictions. (Predict what will happen next using pictures and content as a guide)

- Draw conclusions from information in text. (Recall information from a story by sequencing pictures and events.)

- Apply reading skills and strategies to summarize and compare and contrast information in text, between texts, and across subject areas. (Compare
information [e.g., recognize similarities] in texts using prior knowledge and experience.)

- Demonstrate comprehension by responding to questions (e.g., literal, informational, and evaluative). (Answer literal questions to demonstrate comprehension of orally read grade-appropriate texts.)

- Apply and adjust self-monitoring strategies to assess understanding of text. (Monitor comprehension of orally read texts by asking and answering questions.)

While students are expected to develop these advanced literacy skills throughout their kindergarten year, the students who have not learned basic literacy skills are at a disadvantage. Language development and the emergence of early learning capabilities appear to be relatively resilient processes. Some aspects of language and cognition appear to be less resilient and more open to environmental influence than others, including vocabulary acquisition and attention capacities. These aspects are particularly important to school success and literacy learning, in part, because of the consequences that deficiencies in these skills can set in motion once a child enters formal schooling (National Research Council Institute of Medicine, 2000).

Kaplan and Walpole (2005) have conducted studies on various populations investigating literacy acquisition. Their research has focused specifically on literacy progression from letter recognition to letter-sound association. This association can occur in kindergarten, but it was found that children in grade one make faster gains in literacy than in kindergarten or earlier (McCoach, O’Connell, Reis, & Levitt, 2006). These findings support the fact that overall, many kindergarten students may not possess
the requisite developmental ability for acquiring more complex literacy skills. Because literacy skills that were historically taught in first grade are now currently required in kindergarten, those students with birthdays after July 1 may be at a greater disadvantage for acquiring literacy skills that are necessary for academic success. Wagner, Torgesen, Rashotte, Heck, Barker, Byurges, Donahue, and Garon (1997) have suggested that first-grade learning patterns and rates are consistent with rates of later literacy learning. Precursors to literacy acquisition and success hinge on letter recognition and sound association. However, many kindergarten classrooms teach curriculum at a rapid pace and are spending insufficient time on teaching these skills. Children who are developmentally unprepared to acquire these skills at such a rapid rate will not have had the necessary literacy foundation that would allow them to progress with their peers towards the goal of acquiring more advanced literacy skills, such as reading comprehension.

Compton (2000) has also stated that many children know their letter names by the time they enter grade one and that most know the sounds of the letters by the middle of grade one. Rapid naming, phonemic awareness, and word reading skills all continue to develop through the first grade. The 2009 Ohio academic standards for kindergarten, as listed on the Ohio Department of Education Website, contain skills which researchers have considered to be higher-level skills. More importantly, however, researchers have also indicated that children who are in first grade are more able to acquire these skills which are linked to faster gains in literacy, more successful literacy acquisition, and reading comprehension. Kindergarten students, especially those who are not developmentally ready to grasp required higher-level literacy skills, when required to do
so, may become frustrated, have lower self-esteem, and acquire a negative attitude towards school.

With the correct support or intervention, children who start school lagging behind their peers in language and cognitive abilities do not have to be destined for school failures and dropout status. Early interventions can make substantial contributions to the academic skills of young children (National Research Council Institute of Medicine, 2000). However, those children with birthdays after July 1, even with interventions, may be less able to catch up with more advanced peers because their developmental stage is not as advanced and they are not prepared for the content they are required to grasp.

Literacy acquisition is based on knowing and linking a variety of skills, such as ABC knowledge, phonological awareness, and concepts about print, and each child may have different levels of knowledge within these skill bases. If a child is lacking in one area, it may be difficult to move to a higher level of literacy skill before a lower skill is mastered.

An example of the skills hierarchy would be having ABC knowledge, seeing a letter, naming the letter, identifying the letter in context, associating a sound with the letter, blending sounds of letters together, and forming words with the letters and sounds. Due to the intense pressure on teachers and students to master the standards within the kindergarten grade level, a sufficient amount of time may not be afforded those students who do not have the basic literacy foundational skills.

Those students entering kindergarten with late birthdays often have not acquired the literacy skills necessary to learn to read. Deficiencies in literacy skills often lead to more profound consequences, such as being retained in the primary grades, being singled out for remediation programs, lower self esteem, low achievement and ultimately these
students may be ones who do not complete high school. "The consequences of failing to learn to read in the early grades are severe. Longitudinal studies find that disadvantaged 3rd Graders who have failed one or more grades and are reading below grade level are extremely unlikely to complete High School" (Lloyd, 1978; Kelly et al., 1964)

Literacy, like other developmental processes, is a scaffold and layered learning process that takes place over time and with, as Vygotsky has stated, a person who has more skill in that area. If children are not developmentally ready and do not possess the fine motor skills to hold a pencil, scribble on paper, repeat events of a story, or identify letters and sounds, they are at a disadvantage. They do not possess the early literacy skills needed to acquire those twenty-first-century skills required in our content-oriented kindergarten classrooms. In other words, they are behind before they can get started.

Some have argued that, despite the age differences among children entering kindergarten, children acquire reading skills when they are ready and that this acquisition occurs independently of any intervention. The misinterpretation of research by Durkin (1966), Read (1975) and Price (1976) has been partly responsible for this prevailing opinion. The misinterpretation is that children would automatically acquire skills in literacy when they were ready, not with intervention or support in working with a more skilled person. Misinterpretations contributed to the false impression that early literacy learning is a natural development. Readiness to "soak up" literacy knowledge was in turn considered to be a matter of the child's maturation timetable (Schickedanz, 1999). It was assumed that children would acquire literacy skills naturally on their own. In contrast, Vygotsky has indicated that children learn with appropriate scaffold instruction.

Therefore, if younger children are not accurately identified within their unique
developmental stage and afforded scaffold intervention with a more skilled and knowledgeable teacher, they may not acquire the skills necessary to successfully pass mandated tests prescribed by state and federal governments. Early failure could lead to incorrect identification of the student as having learning difficulties. Labeling students or in other ways identifying them more different than other student’s sets into motion a series of events, some with potential negative consequences—e.g., being identified as requiring special education services or other remediation services. This can result in feelings of detachment in students and may result in lower performance levels in school, lack of motivation, and disconnection with the learning process. Subsequently, it may lead to lower graduation rates and, at worst, reduced ability to earn an income.

Literacy acquisition is not a natural phenomenon; rather, it is a skill that must be acquired by students over time, with the assistance of a skilled teacher. Students enter kindergarten with socially, emotionally, biologically, neurologically different backgrounds and different literacy skill levels. Due to the vast differences in children, it is difficult to expect every student to come prepared to perform in a kindergarten setting that has a rigorous standardized curriculum. Historically, kindergarten was not intended to function as a highly structured, content-based learning environment but an environment where children would have the opportunity to learn how to socialize and be gradually introduced to moderate curriculum. Over time, influences outside of education began to gradually transform the “child’s garden” into what kindergarten is today.

**Purpose of Kindergarten—Past and Present**

Kindergarten was once an environment where children were introduced to the challenges that would be expected of them within a formal education setting. Children
learned to socialize, follow directions, and play with their peers. These important activities laid the foundation for children to learn socialization skills. Friedich Froebel, the pioneer of kindergarten, described an environment where children could grow physically, socially, and spiritually—literally a "child's garden" (Bauer, 2009).

Traditionally, kindergarten has been viewed as children's first organized group educational experience. Through this initial experience, children have been expected to learn how to integrate all of their experiences, including their cognitive, social, and physical competencies, to meet the demands of a structured educational experience (Early, Pianta & Cox, 1999). Kindergarten has been described as setting the stage for subsequent learning and school success because it aims to provide the foundation for future academic progress (Alexander & Enwisle, 1988).

From its origins, the importance of kindergarten in enhancing children's cognitive, physical, and social development has been emphasized. However, Vecchiotti et al. (2001) stated that the focus of teacher training was the promotion of intellectual curiosity, self-expression and social relations through play and group activities. Academic curriculum received little emphasis. Currently, kindergarten classrooms serve as environments where children begin learning how to learn. Emphasis is on content standards and structured curriculum that provide the foundation for the successful completion of the third-grade reading achievement test. Vecchiotti has further stated that while developing or adopting kindergarten curricula, many districts today have not fully investigated current research about young children's development and learning (NAECS'SDE, 2000).
Kindergarten has not always been so content and outcome driven. Kindergarten traditionally consisted of a half-day, low-structure, and low-content environment; however, this model has undergone massive transformation into a mandated full-day, standards- and content-based classroom. Students with late birthdays may be at a disadvantage in receiving the appropriate socialization and developmentally appropriate content they need to optimize their educational success. This is partially the result of the pressure placed on the classroom educator to teach a disproportional number of content-based standards in order to begin preparing students for the third-grade achievement test.

As the curriculum and academic expectations have increased, there is a real danger that the kindergarten program will become developmentally inappropriate for the very young children it is meant to serve. Students with birthdays after July 1 may be impacted more based on their level of development, not their inability to learn. "Many kindergartens no longer aim to foster all areas of children's development, but tend to focus only on academic skills that were once taught in the first grade" (Vecchiotti, 2001).

With increased content being introduced in kindergarten several issues have occurred. Parents of some children with birthdays after July 1 are making the choice to hold their children out of kindergarten for one year. Additionally, teachers often encourage parents to hold a child with a late birthday back for a year due to the perception that younger children upon entrance into kindergarten are not developmentally prepared for the curriculum-based kindergarten program. School districts, based on changes in legislation, feel by holding back younger students they will have a better success rate in regard to high-stakes testing that has been adopted in the state of Ohio.
Political Influences on Kindergarten Curriculum

Legislative policy has been most instrumental in the transformation of kindergarten from a "child’s garden" focused on play and developing peer relationships to its current focus on content-based curricula. In 1999, The Early Childhood Longitudinal Study - Kindergarten Cohort (ECLS-K) indicated that 31% of students entering kindergarten were unable to name letters, and 42% could not demonstrate behavior associated with a successful transition to kindergarten. Kagan & Kauerz (2006, p. 14) stated that policy makers have had a growing concern that all children were not receiving the same education, and they outlined four significant aspects of K-12 education in the United States that have accelerated the attention to early childhood education and the need to be prepared on entrance to kindergarten:

- There is a growing concern of equity and access, which has created achievement gaps.
- Business and corporate worlds have packaged education as an effective and efficient means to increase the competitiveness of American students in the global market. Businesses want to gain an educational advantage and, based on early childhood effectiveness data, are committed to fostering it.
- The ubiquity of and comparatively stable funding for K-12 education has made the notion of preparing children to succeed in school more palatable for advancing an early childhood agenda to policy makers and the public.
- The federal government has exerted a strong influence on state policy to define and measure outcomes of learning not just for K-12 students but for all young children.
The above concerns are mirrored in the No Child Left Behind Act (NCLB) of 2001. This Act is the most recent legislation that has changed the education system nationwide. The intent of NCLB was to close achievement gaps between race, ethnicity, and socioeconomic classes. Its impact is far reaching and has created an increased level of accountability, content-laden early childhood curricula, and pressure on teachers to teach standards related to high-stakes testing. "NCLB requires every school to measure and report annual academic progress for every student from third through eighth grade. States must produce annual statewide report cards that provide disaggregated data, highlighting any achievement gaps among racial, ethnic, socioeconomic, and disability groups (U.S. Department of Education, 2001). In addition to being held accountable for every student's academic success, schools also face financial consequences if they fail to meet certain federally mandated outcomes.

NCLB, with the intent of bridging a gap in achievement, race, and class, also needed to do so based on the demands of business and industry. Historically business has looked to public education as a means to provide a skilled workforce that is able to meet the demands of society and to compete in a global market.

**Skilled Workforce**

Since the inception of public schools, there has been a political motive driven by the need within business and industry for a skilled workforce. Frederick Taylor (1911), an efficiency expert at the turn of the twentieth century, incorporated the production line concept into schools and advocated curriculum that would produce a skilled workforce.

The purpose of public high schools historically has been to provide industry with a skilled workforce. In recent years, the United States has lost a great deal of production
and factory work to other countries. Historically, the United States has been one of the world leaders in education. However, due to the development of the global economy and the educational advances made by other countries, the U.S. educational system has been reduced to a process of testing for excellence through mastering standards. The system has increasingly required more "instruction" for children at an earlier and earlier age with disregard for their developmental level or needs. With the reduction in manufacturing, the United States has been challenged to produce a workforce with more aptitude in math, science, and computer sciences to compete in a world market. However, increased academic intensity must be appropriate for each child's level of development, or schools will produce students who fail rather than succeed in their earliest years.

Policy has historically been shaped by input and demands from business and industry. With the publication of *A Nation at Risk* in 1983, where it was stated that "the dismal state of American education was jeopardizing the United States' competitiveness in the global marketplace" the educational system saw a frenzied effort by business and government to transform education to produce higher academic results and more marketable graduates. *A Nation at Risk* caused businesses to become interested in maximizing all student potential, which would be evidenced by American students' test performance on international tests. This report has given businesses and policymakers a foothold in the education process and has further linked education with workforce development for the purpose of economic prosperity and growth. In 1989, the National Education Goals Panel (NEGP) stated that "by the year 2000, all children in America will start school ready to learn" (p. 1). While conceptually this is a positive statement, in reality the environment, level of development, and culture a child comes from may make
this a lofty and difficult goal to attain. This goal may actually cause a larger gap in achievement.

Policymakers, who served primarily the interests of businesses, had a foothold in the education system, and the educational focus then began to trickle down more towards early education with the formation of other education reform groups, such as the Business Roundtable in 2003 and the Committee for Economic Development in 2002. Pianta (2006) has stated, "Early education is a dependable means to advance American education, and as such, corporate interests have contributed to content driven curriculum in early childhood education in the United States" (p. 15). Due to changes in policy, education began to focus on the very young—i.e., those students who were entering kindergarten and those not yet in kindergarten. Prior to the trickle down of content to preschool and kindergarten, many parents used a child care provider rather than a pre-school to help care for children.

With more focus on early education, preschool curriculum took on an academic form. The change in curriculum force created a gap between children who received some structure and content within a pre-school environment and children who stayed with care providers who may not have had the background to provide a foundation in literacy for children in their care. However, some child care providers often did not have the same guidelines that pre-school programs provided, so all children did not come to school ready to learn.

With the 1998 reauthorization of Head Start, the federal government attempted to define expected child outcomes in the Head Start Child Outcomes Framework. Within this 100-page document, specifications are included about what skills, knowledge,
behaviors, and abilities children should possess in order to be better prepared for a formal education setting. In 2002, Good Start, Grow Smart was introduced to guide states to develop curriculum for kindergarten students which focused on the acquisition of literacy skills in order for school districts to receive federal funds. Due to the complexity of these policies, it was necessary to form the National Early Childhood Accountability Task Force (2005) to offer assistance in school districts interpreting policy.

With the growing concerns from business and industry about academic preparedness came the policy changes. Legislators hoped to close the achievement gaps and make good the promise of offering all children a free and equitable education. What was once a developmentally appropriate "child's garden" where children were encouraged to discover and learn through developmentally- and individually-based instruction and scaffolding has been transformed into a classroom where "rather than evoking learning goals from children's ever-changing interests, universal standards are being pre-specified" (Kagen & Kauerz, 2006, p. 21). This type of education is not synonymous with the original intent of early kindergarten programs. Further, this new system may not be as effective at closing the achievement gaps with those children who are not developmentally able to perform in a standards-based kindergarten classroom.

The changes in legislation have made it difficult for school districts, teachers, and parents to accept children who have late birthdays into a content-driven kindergarten program where children’s social, emotional, and developmental levels may not be the most conducive to a rigorous curriculum with high demands related to high stakes testing. These legislative changes have influenced parents and educators to take other precautionary measures. Parents may have decided to hold their children with late
birthdays back from kindergarten entrance by one year in hopes that they will be better prepared for the rigors of formal education. Teachers and administrators have advised more parents to hold their children back on the premise that younger students may not be as ready to compete in a content driven kindergarten setting. Holding the young students back gives districts an advantage that is reflected in a higher passage rate on high-stakes tests and a higher district report card rating.

**Parental Factors that Influence Kindergarten Enrollment**

Parents are concerned with giving their children the best advantages for success. Many parents of entering kindergarten students believe that holding back their children with late birthdays for a year will allow their children the time necessary to advance developmentally and therefore become more able to compete academically with their peers. When parents have been surveyed about their opinion of children's school readiness and enrollment, one of the most frequent questions they ask is whether their children are too young to enroll (West, Hausken, & Collins, 1993, p. 1). Approximately 10% of American parents defer their children's kindergarten entrance because they believe that they are not developmentally ready. With the added pressure on kindergarten students to be more prepared for content learning that was once introduced and taught in first grade, more parents are making the decision to hold their children back from entering kindergarten for a year. This seems to be most prevalent when the children's birthdays are closer to the cutoff date for kindergarten enrollment. "Children whose birthdays are closest to the cutoff, and therefore those who would be youngest at time of school entry, are most likely to be held back from kindergarten by parents—a process known as "redshirting" (Brent, p. 2, 1996). Brent has further stated that the rising rate of
red-shirting in the United States shows that parents view age, and use age, as a mechanism to manipulate their children’s school experiences and outcomes. This indicates the extent to which beliefs about the importance of age as an indicator and predictor of developmental success dominate some parents’ conceptualizations (NIH Public Access Author Manuscript, 2007). Just as kindergarten has changed, so has the structure of families. In today’s economic times, it is often necessary for both parents in a two-parent household to work. Parents are more aware of the opportunities available to children who have attained academic success, which may be the reasoning behind the rise of red-shirting in our society.

With more two-income families today, parents are cognizant of the importance of academics in their children’s futures. Because they want to prepare their children academically prior to entering school, parents forget that the use of basic common sense will often foster the natural growth and development necessary for a happy and productive child. ”Parents are so worried about the future that they are often blind to the amazing development of their kids” (Tyre, 2008, p. 77). However, even if best for their children, not all parents are able to allow their children the luxury of another year in day care or in the home environment.

Difficult economic times and the upsurge of homes in which both parents are working and single-parent households may necessitate the need for their children to be enrolled as soon as possible in a kindergarten program. While parents consider the possibilities of enrolling their children with late birthdays, it has been reported that affluent parents tend to hold back their summer-born children more often than do low-socioeconomic-status parents (Meisels, 1992). The option of holding a child out for many
parents is economically a difficult decision to make and often times not feasible. While research does indicate that holding back a child with a late birthday can reduce the possibility of failure, for many parents the decision to enroll is based on simple economics, and they hope their children receive whatever help is necessary to get by. Elder (2009) found that being a year older at kindergarten entrance indicated that children would be less likely to repeat a grade while in primary school. In addition, Cascio (2008) found that anecdotally, parents hold children back to give them an edge in the early years. Parents feel by holding their young child out of kindergarten for one year that their children are among the oldest students in the class rather than the youngest and will have a better opportunity for academic success.

Some parents are not opposed to placing children with late birthdays in a formal school setting where they may believe a skilled professional will be able to help their child acquire the necessary skills to become a successful student. However, other parents hold their children back in hopes that the extra year of growth within a less content-driven environment may give their children an advantage by being a year older.

Parents, in order to offer their children the best opportunities for success, self-worth, achievement, and a more positive outlook on formal schooling, often hold back those students with late birthdays, and most often those children are boys. "The idea that older children do better in school is the basis for past policy changes that led to this dramatic increase in kindergarten entrance age" (Elder & Labotsky, 2009, p. 4). With officials in business and government making changes they believed would enhance student growth, they have perhaps created a greater gap for those students who are not able to grasp the skills politicians and those in the business forum feel are necessary to be
successful individuals who are able to compete in a world economy. Elder and Labotsky (2009) have further noted, "Changes in kindergarten statutes have substantially increased average entrance ages" (p. 3). Consequently, statutes at both the federal and state levels have created a more content-laden kindergarten by including content that used to be taught in first grade. Policymakers in their haste to make sure no child is left behind have not listened to educational or professional organizations that specifically have studied the needs of young children. Pianta (2006) offered statistical information from the Early Childhood Longitudinal Study - Kindergarten Cohort (ECLS-K) in 1999, stating that 31% of entering kindergartners were not proficient in recognizing (naming) letters (p. 6). According to West, Denton, and Germino-Hausken (2000), 42% did not demonstrate positive habits associated with successful adjustment in the classroom.

Instead of allowing children to prosper and grow at their own developmental pace, policy makers (with businesses influencing their decisions) have created curriculum expectations that result in a disadvantage for many students.

Parents also realize their children's success may be determined by the mindset of the teachers to whom their children are assigned. If teachers perceive that children with late birthdays do not have the skills necessary to perform within the formal classroom setting, their treatment of these children can play an important role in whether or not children advance.

**Teacher Attitudes and Perceptions**

While the criteria for scholastic advancement have been designed to reflect objectivity (i.e., test scores, academic benchmarks, state standards etc.), teachers' attitudes and perceptions about students' readiness play a crucial role in determining
whether students advance to the next grade level according to several researchers (Allington & Walmsley, 1995; Heaviside & Farris, 1993; Pianta, 2006; Smith, 1989).

From an administrative and classroom management perspective, primary school teachers may prefer to interact with older students who have more maturity and pre-school preparation than their younger counterparts. For example, in one study, almost half of the 40 kindergarten teachers interviewed based their retention recommendations on their beliefs about children's maturity levels. These teachers "believe that, within some normal range of environments, children become more prepared for school according to an evolutionary, physiological unfolding of abilities" (Smith, 1989, p. 136). One reason for this perception is that teachers observe students and realize often that the necessary social skills and attention spans are lacking in many of the younger students they see in their classrooms. These skills are necessary in order for the teachers to work with these younger children so that they can develop higher-level skills in content areas. "Teachers describe challenges in social skills, adjustment, and attention that are simply not well estimated" (Rimm-Kaufman, Pianta, & Cox, 2000, p. 7).

In addition, when teachers have been asked to consider factors that they use in making decisions about children's readiness for school (in discussions with parents), they have identified age as one of the factors they consider (Heaviside & Farris, 1993; NCES, 2004b; NIH Public Access Author Manuscript, Age of Entry, 2007). Their reasoning may be influenced by observation and experience with younger students' level of academic development. Teachers may know through experience with the transition from a developmental kindergarten to a content-laden kindergarten that these students will not adjust well, may display behavior problems, and socially may not be able to develop peer
relationships within the classroom setting. In fact, kindergarten teachers identify age as a factor that figures prominently in definitions and beliefs about readiness for kindergarten, and age is often used as a post hoc explanation for decisions to retain children in kindergarten (NIH Public Access Author Manuscript, 2007). Teachers further may feel they do not want to retain some children due to the stigma it may place on them in the future. In these ways, children's age at the time they enter kindergarten has served as an organizer of teacher beliefs and attributions that, in turn, have led to consequences for children's experiences in school (NIH Public Access Author Manuscript, Age of Entry, 2007, p. 4).

When teachers begin kindergarten screening in the spring of the year preceding kindergarten entry, they often look at the birthdays of children and encourage the parents to consider holding their children out for another school year. In short, age of entry can trigger a set of teacher beliefs, classroom practices, and placement discussions that reflect interactional and transactional mechanisms (NIH Public Access, Author Manuscript, Age of Entry to Kindergarten, 2007; Pianta, 2006). Additionally, teachers feel the pressure of standardized testing and the impact this has on their school and district. In fact, in order to avoid the criticism of peers, some teachers have held back unprepared students.

According to Allington and Walmsley (1995), some teachers have indicated that they fear being criticized by the teachers in the next grade for passing students who were ill-prepared (Of Primary Interest, Winter 1998). This especially affects young, enthusiastic students who are anxious to please. The young students may begin to feel they have done something wrong or are inadequate when they are held back. They often develop a
mindset that they are not able to perform. This mindset, coupled with teachers’ perceptions of the student being held back, can stifle the natural curiosity of children.

**Conclusion**

Chapter Two has discussed research on the conceptualization of child development and factors that have an impact on a child’s development, such as children’s environment, biological and neurological differences among children, and differences between genders. This research has suggested that students, particularly boys, with late birthdays may be at a greater disadvantage when learning within content-laden kindergarten programs.

The discussion moved and centered around Vygotsky’s theory of the Zone of Proximal Development (ZPD) as it relates to learning and how this theory relates and connects to literacy development in children entering kindergarten. There was specific focus on why ZPD principles are an integral component in establishing a child’s level of development, cognitively, socially, and emotionally, with a special emphasis on literacy development.

This chapter provided a brief historical view of kindergarten and discussed how business and government, through policy and governmental mandates, transformed what was once an arena for socialization, play, and discovery into a standards-based, content-rich environment. Finally, Chapter 2 discussed the dilemma of how parents and teachers have attempted to ensure children's success within formal education while balancing the economic challenges and demands within society and standards-based demands on learning content.
Chapter 3 includes a description of the methodology for the study. It also analyzes scores on the Ohio Third Grade Reading Achievement Assessment from students in school districts in rural northwest Ohio and provides a rationale for conducting this particular study. Additionally, Chapter 3 details the research design and data analysis processes selected for this study.
Chapter 3

Method

The age at which children should enter kindergarten has been debated among educational specialists for a number of years. What was originally conceived as a place where children could play and develop their social skills in a friendly, welcoming, non-regimented environment—literally a "child's garden"—has now become a controversial educational issue influenced by economic, educational, and social forces. These various forces have created an environment that in many instances results in unequal treatment among older and younger students who are at varying stages of development when they enter kindergarten. Because the social, emotional, and intellectual capacities of children vary, children with late birthdays may not be ready to enter a kindergarten environment that is heavily content based and places a high value on academic preparation. Nevertheless, forced by economic and other factors, parents often enroll their children in kindergarten at an early age, even though this may be detrimental to their academic, social, and intellectual development. The result is that students who are better prepared academically, often older students, experience significant advantages over their younger counterparts. As a result of the different treatment that older and younger students often receive, unequal academic treatment may occur and obstruct progress toward the goals and outcomes that these educational systems were designed to achieve.
In order to explore the potential relationship between age of kindergarten entrance and its impact on academic performance, this study investigates whether kindergarten entrance age of children in rural northwest Ohio affects achievement on the Ohio Third Grade Reading Achievement Assessment. More specifically, this study investigates whether children entering kindergarten with birthdays after July 1 score lower on the Ohio Third Grade Reading Achievement Assessment than do children entering kindergarten with birthdays prior to July 1. This study also investigates whether the gender of early entrance kindergarten students with birthdays after July 1 and late entrance kindergarten students with birthdays before July 1 impacts the results of the Ohio Third Grade Reading Achievement Assessment.

Chapter 3 describes the method used to conduct this study and details the procedures used to gather, analyze, and interpret data. It includes information about the research design, sample selection, instrumentation, data collection, and data analysis.

Research Questions

The study is designed to examine two research questions and their corresponding hypotheses and null hypotheses:

**RQ1.** Is there a relationship between the age at which children in rural northwest Ohio school districts enter kindergarten and their scores on the Ohio Third Grade Reading Achievement Assessment?

**H1.** There is a relationship between the age at which children in rural northwest Ohio school districts enter kindergarten and their scores on the Ohio Third Grade Reading Achievement Assessment.
H01. There is no relationship between the age at which children in rural northwest Ohio school districts enter kindergarten and their scores on the Ohio Third Grade Reading Achievement Assessment.

RQ2. Do boys entering kindergarten from rural NW Ohio whose birthdays occur after July 1 perform lower on the Ohio Third Grade Reading Achievement Assessment than do girls with birthdays after July 1?

H2. Boys with birthdays after July 1 will score statistically significantly lower on the Ohio Third Grade Reading Achievement Assessment than girls with birthdays after July 1.

H02. There is no statistically significant difference between the scores of boys with birthdays after July 1 and girls with birthdays after July 1 on the Ohio Third Grade Reading Achievement Assessment.

Research Design

This research design employs a quantitative non-experimental research method to determine whether there is a relationship between the age at which children entered kindergarten and their academic performance on a mandatory state-sponsored assessment. The research design focuses specifically on whether there is a relationship between the age at which children enter kindergarten and their performance on the Ohio Third Grade Reading Achievement Assessment. In addition, this research design explores whether there is a relationship between the gender (male or female) of students entering kindergarten who are born before or after July 1 and their scores on the Ohio Third Grade Reading Achievement Assessment. Scores on the Ohio Third Grade Reading Achievement Assessment for the years 2007, 2008, and 2009 are analyzed.
The methods that were used to investigate this relationship are a simple linear regression model and a two-sample t-test. The regression model was selected because it is often used to describe the relationship between two variables and to draw conclusions based on the strength of that relationship. In this case, the relationship under investigation is the age at which students enter kindergarten (the independent variable) and their scores on the Ohio Third Grade Reading Achievement Assessment (the dependent variable).

The two-sample t-test was selected to compare the mean scores of boys whose birthdays occur after July 1 with the mean scores of girls whose birthdays occur after July 1.

**Rationale for Selection of Variables**

**Dependent variable.** Mandated by law, the Ohio Third Grade Reading Achievement Assessment must be administered to every child in Ohio during his or her third-grade academic year. The test is taken by every third-grade student throughout the state during the same two-week testing window. Because it is ubiquitously administered, this assessment provides a valuable opportunity to gather data that can be used to explore the progress of students and compare that progress with other markers of academic advancement. Using this assessment as a measure of students' academic performance provides a consistent way to collect data from school districts throughout various locations in Ohio because it represents a uniform measure of academic performance. The only students who are not required to take the Ohio Third Grade Reading Achievement Assessment are those students who have been identified as requiring an alternative form of assessment. These students are most often students who have multiple handicaps and have received approval to take an alternative state-approved assessment in another form. Presently, only 1% of a school's special education population is approved for an
alternative form of assessment (Ohio Department of Education, 2009). As a result, virtually all third-grade students take the mandated Ohio Third Grade Reading Achievement Assessment, making it an appropriate assessment for this study.

**Independent variable.** In 2001, the State of Ohio (within ORC 3321.01) gave school districts the option of adopting (through district policy) either August 1 or September 30 as the date a child must have turned age five to be admitted to kindergarten. This means that the board of education for each local district was empowered with the authority to make the decision about which date to adopt. Most boards relied upon the superintendent of each respective district to present information that helped board members make their decision. Within the three counties represented in this study, district superintendents (along with the help of kindergarten teachers) prepared rationale to support their recommendations. The superintendents of the school districts presented the information to their respective boards and made recommendations regarding which date to accept. Each board then voted, and the cutoff dates were adopted as policy. Only two school districts within one of the smaller counties altered their kindergarten entrance date from September 30 to August 1 prior to offering an all-day kindergarten compared to the traditional half-day kindergarten program. The districts participating in this study were split in the date in which they permitted children who reached age five to enter kindergarten. The school districts within two counties adopted September 30, with the exception of two districts within one of the counties, and the larger county adopted August 1. The cutoff date selected for this study was July 1. July 1 was selected because it was 30 days before the August 1 cutoff and between the two different cutoff dates adopted by the school districts that participated in this study. July 1
is 30 days prior to the cutoff date (August 1) adopted by the larger districts within one county and 60 days prior to the cutoff date (September 30) adopted by the school districts within the smaller counties.

**Level of Significance**

Statistical significance is a term used to describe the degree to which researchers can be confident that the results of a study are not due to chance. The level of significance for this research study was set at alpha .05 in an attempt to reasonably avoid a Type I error. This level of significance was chosen because if the null hypothesis is true, there is a desire to keep the chance low of falsely rejecting it.

**Sample Selection**

The sample for this study is composed of 2,295 third-grade students who attended schools within 10 different school districts in rural northwest Ohio over a three-year period (2007, 2008, and 2009). The students who comprised the sample were predominately from Williams and Fulton counties. The schools for this study were selected based on availability of data to the researcher, the trust the researcher had established with district leaders in the area, and access due to the researcher's position within rural northwest Ohio. Data from a total of 10 school districts were gathered. The sample data consisted of total reading scores, birth dates and gender of the students in the sample. Due to the confidential nature of the data, it was important that the researcher (1) held a leadership position within the northwest Ohio region, (2) understood that the data could be extracted without revealing confidential student information, (3) had regional leadership support and assistance in developing criteria to guide other district leaders in gathering data in a step-by-step manner that ensured confidentiality.
Instrumentation

The Ohio Third Grade Reading Achievement Assessment is a commercially prepared assessment. This assessment is a criterion-referenced tool which the State of Ohio uses to measure the degree to which students have mastered the Ohio Academic Content Standards for English/Language Arts (American Institutes of Research, 2008). Content standards describe the information students should know and the tasks they should be able to accomplish by the end of each grade; these content standards provide a guide that help teachers ensure that students are prepared for the grade-level assessments they are required to take.

The Ohio Third Grade Reading Achievement Assessment consists of 36 or 37 questions. The number of questions selected differs on point value because one year a test of 36 questions will be selected and thus would have more extended response questions, which are higher point value. Other years, there may be more multiple-choice questions, which are worth one point. Either way, the total point value equals 49. The test questions are assigned different point values based on level of difficulty. Level of difficulty is based on the type of response, one point is awarded for the easiest questions, two points are awarded for more difficult questions, and four points are awarded for the most difficult questions. The questions are valued as follows: multiple-choice questions (1 point), short-answer questions (2 points), extended-response questions (4 points). In this study, the total reading score are used because that is the number the state utilizes to place the student in the 5 ranges, advanced, accelerate, proficient, basic, and below basic. Within the Ohio Third Grade Reading Achievement Assessment, four sub-scales are used to measure students’ overall reading ability:
• **Acquisition of Vocabulary:** Students determine out what new words mean by looking at the context surrounding the new words. Students also use what they know word parts to understand whole words.

• **Informational Text:** Students use text features (e.g., titles, index, pictures) to understand informational texts (e.g., maps, instructions, non-fiction). They know how to draw conclusions from information in charts, graphs, and diagrams.

• **Literary Text:** Students compare and contrast the plots of different stories. They use details from stories to describe characters and settings and can retell the events of the stories. They also explain the features of different types of literature (e.g., fairy tales, folk tales, and poems).

• **Reading Process:** Students read books by themselves and use reading strategies to help understand what they read. For example, they summarize stories, articles or book chapters by putting information in the right order and by including main ideas and important details.

The Ohio Third Grade Reading Achievement Assessment is administered twice a year every October and May. All students are required by law to complete both administrations. The results of the May administration of this assessment were selected as the dependent variable for this study for several reasons. First, at the time of the May administration, the students have completed almost nine months of instruction with a qualified teaching professional. Consequently, the scores on the May administration of the assessment provide a better indication of whether students are proficient in reading as determined by the parameters of the assessment. Secondly, some students may have
passed the assessment in October but attained an even higher score in the May administration. Third, a higher number of students are typically present for testing during the May administration, increasing the potential for a larger sample.

In addition to compiling individual student test data and transferring the data to school and district report cards, the Ohio Department of Education (ODE) posts statistical summary data for each school year on the ODE website. The summary information is based on the scores of students from public schools within the state of Ohio who took the Ohio Third Grade Reading Achievement Assessment within that particular year. In May of 2007, 124,605 third-grade students were administered the Ohio Third Grade Reading Achievement Assessment. Seventy-six percent of the students who were administered the assessment scored at or above the proficient (passing) standard. Seventy-three percent of males scored at or above the proficient standard, and 79% of females scored at or above the proficient standard.

**Reliability and validity.** The reliability of the May 2007 Ohio Third Grade Reading Achievement Assessment was assessed at .88 (Ohio Department of Education 2007). However, information about the validity of the Ohio Third Grade Reading Achievement Assessment is difficult to obtain. According to Max Xu, Associate Director of the Office of Assessment, Ohio Department of Education, information about the validity of an assessment "is difficult to obtain and report as validity is imbedded in the process of test development" (as cited in Pangrac, 2009. p. 65). According to a report from the American Institutes for Research (AIR) (2008), validity is not an attribute of tests but rather refers to a process whereby the meaning and interpretation of test scores can be established for a variety of intended and even unintended purposes. As such, a
test is not valid or invalid; rather, the soundness of interpretations based on test scores is evaluated on the basis of evidence about test properties and test performance across subgroups within the intended (or even unintended) test population" (p. 4)

In May 2008, 124,102 third-grade students were administered the Ohio Third Grade Reading Achievement Assessment. Seventy-four percent of all students scored at the proficient (passing) level or above, 71% of males scored at the proficient level or above, and 77% of females scored at the proficient level or above, with a reliability factor of .86. (Ohio Department of Education, 2009). The data for the May 2009 Ohio Third Grade Reading Achievement Assessment indicated that 125,177 students were administered the Ohio Third Grade Reading Achievement Assessment. Seventy-five percent of all students scored at the proficient level or above, 73% of males scored at the proficient level or above, and 78% of females scored at the proficient or above, a reliability factor of .86 (Ohio Department of Education, 2009).

As a means of validating the Ohio Third Grade Reading Achievement Assessment, this instrument was studied by the American Institutes for Research (AIR) as requested by the U.S. Department of Education as part of the requirements by all states to comply with No Child Left Behind. The AIR (2008) listed two important findings in relation to the Ohio Reading Achievement Test.

First, each test item on the Ohio Third Grade Reading Achievement Assessment successfully addressed one academic content standard. According to the Ohio Department of Education (2010), "Academic content standards describe the knowledge and skills that students should attain, often called the "what" of "what students should know and be able to do" (para 1). Content validity is achieved to the extent that the
questions on the Ohio Third Grade Reading Achievement Assessment measure students’ knowledge in each respective content area.

Secondly, student achievement related to the four broad content areas included in the reading portion of the Ohio Third Grade Reading Achievement Assessment is an accurate indicator of overall reading achievement. The four broad content areas are acquisition of vocabulary, informational text, literary text, and the reading process. These are areas which have been identified by the State of Ohio as essential components of literacy acquisition (Ohio Department of Education, 2010). This suggests proficiency in each content area (individually and collectively) contributes to what experts in the field of educational literacy have identified as "reading proficiency."

After they complete the assessment, students' scores are broken down into five performance levels. The scores and performance levels are as follows:

*Advanced:* Score of 432 or above. Students go beyond understanding what they read to explain what they like or do not like about a story.

*Accelerated:* Score of 401-431. Students understand what they read (e.g., fairy tales, folk tales, poetry) and compare stories with other stories.

*Proficient:* Score of 385-400. Students understand what they read. They try to list important ideas in the texts they read.

*Basic:* Score of 266-384. Students understand some of what they read. They use strategies (e.g., clues in sentences and paragraphs, knowledge of word parts) to learn new words.

*Limited:* Score of 265 or below. Students may struggle with simple reading tasks (e.g., fairy tales, folk tales, and poetry).
Students who score at the "proficient" level and above pass the reading achievement assessment. Students who do not attain a score of 400 or above are offered remediation and the opportunity to complete the assessment again in the summer prior to entering the fourth grade. The importance of the remediation and the third-grade reading assessment was due in part to Amended Senate Bill 55, which contained a provision that was dubbed "the fourth-grade guarantee." The guarantee required fourth-grade students to pass (at the proficient level or above) the Fourth Grade Ohio Reading Achievement Assessment. If students did not attain a score of 400 or above and thereby attain the proficient level, they were not promoted to the fifth grade. There were conditions affixed to this guarantee, which allowed for the promotion of students who had not scored a level of proficiency. The student's principal and reading teacher could agree that the student should be promoted. The addendum placed a burden and liability on the principal, reading teacher, and school district if in later years students or parents believed that because of an unwarranted promotion according to test scores, students were placed in a position where they were not successful. In March 1998, 32% of fourth graders did not meet the "proficient" level. As a result, this requirement was eliminated but replaced with Ohio Revised Code (ORC) 3313.608, which states the criteria for third-grade students who enter the third grade beginning July 1, 2009 and provides instructions about how to treat student who do not meet specific score range targets:

(1) Promote the student to fourth grade if the student's principal and reading teacher agree that other evaluations of the student's skill in reading demonstrate that the student is academically prepared to be promoted to fourth grade.
(2) Promote the student to fourth grade but provide the student with intensive intervention services in fourth grade.

(3) Retain the student in third grade. (Ohio Revised Code, 2010)

**Data Collection Procedures**

This study used data from the May administration of the Ohio Third Grade Reading Achievement Assessment in the years 2007, 2008, and 2009. The Ohio Department of Education district report card information is assessable to anyone wishing to look at individual district testing and demographic information. It features cumulative achievement data for individual schools and districts. The Success Ohio Portal was used to obtain specific individual student data. The portal allows administrators to extract individual student data from the ODE site. The Success Ohio Portal is accessible by district superintendents or their designates and can only be accessed by using a personal username and password. The Success Ohio Portal protects student data and other confidential information.

The researcher addressed a letter of invitation to 14 district superintendents who all represent rural districts in northwest Ohio, inviting them to participate in this research study. The letter explained the purpose of the study and asked these superintendents to extract specific information regarding third-grade reading scores for students in their districts from the 2007, 2008, 2009 achievement assessments (see Appendix A).

Specifically, the letter asked superintendents to access the Success Ohio Portal; download the reading achievement scores for third-grade students in their districts for the years 2007, 2008, and 2009; and delete any personal information to ensure that students' identities remained confidential. The data requested from each school district included
(1) the school district, (2) the year of testing, (3) the month of testing, (4) the students' grade level, (5) the reading test total scores, (6) the students' gender, and (7) the students' birth dates. The deleted information included students' personal identification numbers and all other assessment information other than the reading achievement scores. An Excel spreadsheet was used to capture the requested data. Data from 12 districts were collected for this study: Defiance, Evergreen, Edgerton, Wauseon, Stryker, Montpelier, Pettisville, Swanton, West Unity, North Central, Hicksville, and Pike Delta York. However, data from only 10 districts were used in this study because data from two districts (North Central and Hicksville) were incomplete. The district superintendent or testing agent provided the data from each participating district. The data reflect the score of every student within these rural northwest Ohio districts who took the Ohio Third Grade Reading Achievement Assessment in May for 2007, 2008, and 2009. An email address was provided, and superintendents were asked to forward data to the researcher electronically. The directions that were provided to superintendents are located in Appendix B.

**Data Analysis**

The data analysis phase of this research study included several steps. First, the researcher gathered the total reading scores of students who completed the Ohio Third Grade Reading Achievement Assessment in 2007, 2008, and 2009. The researcher also gathered information indicating the students' gender and birth dates. For the three years combined, information from 2,295 students was analyzed. There were 236 students with birth dates after July 1 and 2,059 students with birth dates prior to July 1. The statistical software analysis program Minitab was used to analyze the data. Minitab is a statistical
software package used extensively in business, professional, and academic settings. Next, using a conversion function in Minitab, the birth dates were converted from a standard format (e.g., 03-23-1998) to a number indicating the age of students at the time of testing. To convert the birth dates of students into a quantifiable age (in days), a cutoff date of July 1 was used. This procedure ensured that the ages of students were calculated consistently to determine their age at the time of testing.

**RQ1.** To test the null hypothesis for Research Question 1, Pearson product-moment correlation coefficients were calculated using the age of students (in days) and their total reading scores for each year (2007, 2008, and 2009). For each data set, a regression analysis was conducted. A least squares regression analysis was performed to determine the regression of the students' total reading scores on the age of the students. Separate regression analyses were conducted comparing the scores of boys only, the scores of girls only, and combined gender scores for each year with their ages at the time of testing. In addition, a General Linear Model (GLM) analysis was conducted to determine whether there was a significant difference among the mean scores of students in all 10 districts.

The GLM is a statistical theory/model that covers many parametric techniques, including simple and multiple regression. The aim is to determine which one of the independent variables predicts the dependent variable. It is used for comparison in determining which of the independent variables has a greater influence. Likewise, it is used to determine the strongest predictor of the dependent variable. In other words, the GLM is used to determine what the impact is of independent variables on a dependent variable. When using the GLM, it is assumed that the relationship between the
independent variable and dependent variables is linear in nature. Nonparametric analyses were conducted because of relatively large differences in the sample sizes of the districts.

RQ2. A series of two-sample t-tests were conducted to test the null hypothesis for Research Question 2. The t-test determined whether a statistically significant difference existed between the mean scores of boys born after July 1 and the mean scores of girls born after July 1 on the Ohio Third Grade Reading Achievement Assessment. An individual t-test was conducted comparing the mean scores of boys and girls whose birthdays occur after July 1 for each year (2007, 2008, and 2009) and for all three years collectively (2007-2009).

Limitations

Several factors limit this study. Chief among them is sample size. The school districts that participated in this study have total student enrollments in kindergarten through twelfth grade, ranging from under 500 students to 1,100 students. Two districts chose not to participate, which would have increased the sample size by 1293 students. Two other districts did not submit complete data for all students during the three-year period requested, which would have increased the sample size by 335 students.

Another limitation is the fact that there are differences between districts in terms of whether they offer half-day, all-day, or both half day and full day kindergarten. Of the participating districts in 2005 and 2006, 12 offered half-day kindergarten programs. In the 2007 school year, all 10 of the participating districts transitioned to all-day every day kindergarten. State law, however, stated districts must offer a half-day kindergarten program for parents not wanting their child to attend a full day program. Eight districts
offered a half-day kindergarten program to accommodate students whose parents desired a half-day program.

Finally, because this essay features a linear regression analysis, the results may not fully account for additional variables that might affect the relationship between test scores and early entrance into kindergarten. For example, including socio-economic-status (SES) data may account for the relationship between students with late birthdays entering kindergarten who are from homes in poverty status compared to the scores of students who are from higher SES homes. In addition, this study did not utilize information or results from the Kindergarten Readiness Assessment--Literacy (KRAL) assessment, which may be a more accurate indicator of kindergarten readiness because it is based on developmental level rather than age.

**Summary**

Chapter 3 describes the methods used for this study, including the research design, the rationale for selection of criteria, the level of significance, the sample selection process, the instruments used, the data collection procedures, the data analysis process, and limitations. Chapter 4 presents the results of the data analysis as they apply to the research questions presented in this study.
Chapter 4

Results

The purpose of this study is to explore two research questions. The first research question seeks to determine whether there is a relationship between the age at which children in rural northwest Ohio school districts enter kindergarten and their scores on the Ohio Third Grade Reading Achievement Assessment. The second research question seeks to determine whether boys whose birthdays occur after July 1 at the time of kindergarten entrance score lower than girls whose birthdays occur after July 1. Because of the frequent disparity of treatment between less prepared younger students and older students in kindergarten programs, determining the extent to which social, emotional, psychological, and developmental differences impact the education that students receive can have far-reaching academic effects. In addition to these academic effects, political and legislative determinations related to academic preparation and early childhood education are also implicated through the results of this study. This chapter examines the scores of students on the Ohio Third Grade Reading Achievement Assessment to determine whether there is a relationship between students' age at kindergarten entrance and their scores on a state-mandated third-grade reading achievement assessment.
Sample Selection

Studies have indicated that younger students may be disadvantaged in kindergarten programs in urban areas. However, the research is unclear about the effects of age at kindergarten entrance on academic performance in rural areas. This study explored the possible effects of age on the academic success among students in kindergarten programs in rural areas. The sample participants for this study were identified by the geographic region where they attended school. The schools in this study were classified as "rural" by the Ohio Department of Education, and the students were all in third grade when the Ohio Third Grade Reading Achievement Assessment was administered in May of 2007, 2008, and 2009. All students in Ohio are required to take the Ohio Third Grade Reading Achievement Assessment in October and May of their third-grade year. A total of 2,295 students were administered this assessment and comprised the sample for this study. Of the 2,295 students who were administered this third-grade assessment, 236 had birth dates after July 1, and 2,059 had birth dates prior to July 1. The students were selected based on the following criteria: (1) students attended a rural northwest Ohio school, (2) students completed the Ohio Third Grade Reading Achievement Assessment, (3) students completed the Ohio Third Grade Reading Achievement Assessment in the spring at the same school as they did in the fall and the score was recorded in that district, and (4) students had been enrolled in kindergarten.

Instrumentation

The primary instrument used in this study was the Ohio Third Grade Reading Achievement Assessment. The Ohio Third Grade Reading Achievement Assessment has been determined to be a reliable and valid instrument. Reliability data for this assessment
is published every year by the Ohio Department of Education. The following reliability factors have been determined for the 2007, 2008, and 2009 editions of the Ohio Third Grade Reading Achievement Assessment, respectively: 0.88, 0.86, and 0.86. Information about the validity of this assessment is not readily available; however, the American Institutes of Research conducted a study on the validity of test scores at the request of the U.S. Department of Education. This was requested due to the NCLB compliance. The researches stated that the Ohio Achievement Test scores achieved validity because the assessment items were aligned with the Ohio Academic Content Standards and served as indicators of overall reading achievement (American Institutes of Research, 2008).

**Data Collection Procedures**

Scores for students who were administered the Ohio Third Grade Reading Achievement Assessment were gathered from the Success Ohio Portal, and all personally identifiable information was omitted to preserve anonymity and confidentiality. The Success Ohio Portal allows administrators to review, examine, and download student data from the Ohio Department of Education website and is accessible by district superintendents or their designates. Test results for 2007, 2008, and 2009 were extracted from the Success Ohio Portal, with permission, by district superintendents from rural districts in northwest Ohio. The Success Ohio Portal allows district leaders and district testing centers to access student data through a secure personal sign-in process that is password protected. The data was downloaded into an Excel spreadsheet containing the following information: the year and month tested, student identification code, birth date, gender, and total reading score. The identification codes were instructed to delete the
personal identification codes before transmitting the Excel file to the researcher to preserve anonymity and confidentiality of student information.

**Analysis of the Data**

From 2007 to 2009, 2,296 students were administered the Ohio Third Grade Reading Achievement Assessment in the 10 rural northwest Ohio school districts that comprised this study. In 2007, 782 students were administered this assessment; in 2008, 715 students were administered this assessment; and in 2009, 798 students were administered this assessment. The percentage of students who achieved a passing score of "proficient" or above on the Ohio Third Grade Reading Achievement Assessment from 2007 through 2009 was equal to 75%. Students who achieved a score of 74% or below did not pass the reading assessment and were thus eligible for remediation and the opportunity to re-take the reading assessment subsequent to completing the remediation.

Analysis of the data was conducted using two statistical models: simple linear regression analysis and a series of two-sample t-tests. Simple linear regression analysis was used to determine the results of Research Question 1, and a series of two-sample t-tests was conducted to determine the results of Research Question 2.

**Results of Research Question 1**

**RQ1.** Is there a relationship between the age at which children in rural northwest Ohio school districts enter kindergarten and their scores on the Ohio Third Grade Reading Achievement Assessment?

**H1.** There is a relationship between the age at which children in rural northwest Ohio school districts enter kindergarten and their scores on the Ohio Third Grade Reading Achievement Assessment.
H01. There is no relationship between the age at which children in rural northwest Ohio school districts enter kindergarten and their scores on the Ohio Third Grade Reading Achievement Assessment.

Simple linear regression analysis was used to answer the first research question. The regression analysis compared the scores of students whose birthdays occurred before July 1 and the scores of students whose birthdays occurred after July 1 on the Ohio Third Grade Reading Achievement Assessment. The first regression analysis combined the scores of all students (boys and girls) who were administered the assessment in all three years (2007, 2008, and 2009) and compared those scores with the students' ages at kindergarten entrance. Although the correlation is weak ($r = -0.10$), a slight negative linear correlation exists between the age at kindergarten entrance and reading achievement scores. This suggests that as the age of students (boys and girls combined) at kindergarten entrance increases, their scores on the reading achievement test in their third-grade year decreases (i.e., students who are older when they enter kindergarten perform worse on reading achievement tests three years later). The fact that students’ scores decline as their age at kindergarten entrance increases seems to contradict prior research studies which suggest that students who enter kindergarten at an older age tend to perform better academically, not worse. As a result, the negative correlation appearing in this study suggests that other potentially intervening variables may be responsible for the declining scores (e.g., participation in all-day or half-day kindergarten, teacher perceptions of student abilities, social development, etc.).
Figure 4-1. Scatter plot showing the relationship between the scores of boys and girls who were administered the assessment in 2007, 2008, and 2009 (combined) and their ages upon entrance into kindergarten.

The Pearson product-moment correlation coefficient was determined to be -0.101 (see Fig. 1). ($r=-0.10$), and the percent of shared variance between the two variables was 0.01 ($r^2$), suggesting that there is a slightly negative correlation between age at kindergarten entrance and performance on the Ohio Third Grade Reading Achievement Assessment during these three years combined.

Because the results of the first regression analysis reflected an unexpected trend (i.e., a slightly negative correlation) when data from both genders (boys and girls) in all three years (2007, 2008, and 2009) were combined, additional regression analyses were conducted for boys only in all three years and for each year separately. These additional regression analyses were conducted in an attempt to determine whether the relationship...
between age at kindergarten entrance and reading achievement scores for boys was different than it was for girls. In other words, these additional analyses sought to determine whether the same trend toward negative correlation existed when students’ scores were separated by gender. Therefore, the second regression analysis combined the scores of boys who were administered the assessment in all three years (2007, 2008, and 2009) and compared those scores with their ages at kindergarten entrance. The Pearson product-moment correlation coefficient was determined to be -0.118 (see Fig. 2). A slight negative correlation was found to exist between the scores of boys on the reading achievement assessment and their age at kindergarten entrance. The results suggest that the scores of both boys and girls decline as their age at kindergarten entrance increases. However, the scores of boys tend to drop more sharply as their age at kindergarten entrance increases than do the scores of girls.
Figure 4-2. Scatter plot showing the relationship between the scores of boys who were administered the assessment in 2007, 2008, and 2009 (combined) and their ages upon entrance into kindergarten. The two variables were slightly negatively correlated, $r = -0.118$. The percent of shared variance between the two variables was 0.01 ($r^2$).

After analyzing the scores of boys and girls over the span of all three years (combined), the next step was to determine whether any differences existed between age at kindergarten entrance and reading achievement scores during each individual year (2007 or 2008 or 2009). Regression analyses were conducted for each year independently, and scatter plots were generated to indicate the relationship between age at kindergarten entrance for boys and girls combined as well as for boys only. Therefore,
the third regression analysis combined the scores of boys and girls who were administered the assessment in 2009 and compared those scores with the students' ages upon entrance into kindergarten. The Pearson product-moment correlation coefficient was determined to be -0.059 (see Fig. 3), indicating that virtually no relationship exists between the scores of boys and girls (combined) and their age at kindergarten entrance for the year 2009.

![Regression Analysis Chart]

*Figure 4-3.* Scatter plot showing the relationship between the scores of boys and girls who were administered the assessment in 2009 and their ages upon entrance into kindergarten. The two variables were shown to be negatively correlated, r = -0.059, P-Value = 0.096. The percent of shared variance between the two variables was 0.003 (r2)

The fourth regression analysis included the scores of only those boys who were administered the reading achievement assessment in 2009 and compared those scores with their ages at kindergarten entrance. The Pearson product-moment correlation coefficient
coefficient was determined to be -0.052 (see Fig. 4), indicating that virtually no relationship exists between the scores of boys and their age at kindergarten entrance for the year 2009. Because the correlation coefficients were similar between the combined scores of boys and girls and the scores of boys only when compared to age at kindergarten entrance, it can be assumed that no gender differences existed.

![RQ1-Reading achievement test scores (boys only) and kindergarten entrance ages for 2009](image)

2009 boys scores = 416.3 - 8.003 2009 boys age (years)

**Figure 4-4.** Scatter plot showing the relationship between the scores of boys who were administered the assessment in 2009 and their ages upon entrance into kindergarten. The two variables were negatively correlated, $r = -0.052$, $P$-Value = 0.294, $p < .05$. The percent of shared variance between the two variables was 0.086 ($r^2$).
The fifth regression analysis combined the scores of boys and girls who were administered the assessment in 2008 and compared those scores with the students' ages upon entrance into kindergarten. The Pearson product-moment correlation coefficient was determined to be -0.133 (see Fig. 5), indicating a slight negative linear correlation between age at kindergarten entrance and reading achievement scores.

Figure 4-5. Scatter plot showing the relationship between the scores of boys and girls who were administered the assessment in 2008 and their ages upon entrance into kindergarten. The two variables were negatively correlated, \( r = -0.133 \), P-Value = 0.000. The percent of shared variance between the two variables was 0.017 (r2).

The sixth regression analysis included the scores of only those boys who were administered the assessment in 2008 and compared those scores with their ages at kindergarten entrance. The Pearson product-moment correlation coefficient was
determined to be -0.133 (see Fig. 5), indicating a slight negative linear correlation between age at kindergarten entrance and reading achievement scores.

\[ \text{2008 boys scores} = 537.9 - 28.88 \times \text{2008 boys age (years)} \]

\[ S = 72.7294 \]
\[ R-Sq = 2.8\% \]
\[ R-Sq(adj) = 2.5\% \]

Figure 4-6. Scatter plot showing the relationship between the scores of boys who were administered the assessment in 2008 and their ages upon entrance into kindergarten. The two variables were negatively correlated, \( r = -0.166, \) \( P-\text{Value} = 0.002. \) The percent of shared variance between the two variables was 0.027 (r2).

The seventh regression analysis combined the scores of boys and girls who were administered the assessment in 2007 and compared those scores with the students' ages upon entrance into kindergarten. The Pearson product-moment correlation coefficient was determined to be -0.107 (see Fig. 7), indicating a slight negative linear correlation between age at kindergarten entrance and reading achievement scores.
Figure 4-7. Scatter plot showing the relationship between the scores of boys and girls who were administered the assessment in 2007 and their ages upon entrance into kindergarten. The two variables were negatively correlated, $r = -0.107$, $P$-Value $= 0.003$. The percent of shared variance between the two variables was 0.011 ($r^2$).

The eighth regression analysis combined the scores of boys who were administered the assessment in 2007 and compared those scores with the students' ages upon entrance into kindergarten (see Fig. 8), indicating a slight negative correlation between age at kindergarten entrance and reading achievement scores.
Figure 4.8. Scatter plot showing the relationship between the scores of boys who were administered the assessment in 2007 and their ages upon entrance into kindergarten. The two variables were negatively correlated, \( r = -0.133 \), \( P \)-Value = 0.006. The percent of shared variance between the two variables was 0.017 (r2).

Overall, the results of the eight regression analyses indicate a slight negative correlation between the age at kindergarten entrance and reading achievement scores. The correlation coefficients for each year indicate a similar relationship (i.e., negative linear correlation) for both genders, suggesting that the reading achievement scores for both boys and girls decreases as their age at kindergarten increases. In every year but one (2009), the slope of the regression line drops when the scores of only the boys are separated, suggesting that boys perform even more poorly than do girls as their age at kindergarten entrance increases (see Table 4.1).
Table 4.1
*Correlation coefficients reflecting the relationship between age at kindergarten entrance and reading achievement scores for boys and girls (together) and boys only in 2007, 2008, and 2009.*

<table>
<thead>
<tr>
<th>Years</th>
<th>Gender</th>
<th>r</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007-2009 (combined)</td>
<td>Boys and Girls</td>
<td>-.100</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Boys only</td>
<td>-.118</td>
<td>.018</td>
</tr>
<tr>
<td>2009</td>
<td>Boys and Girls</td>
<td>-.059</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Boys only</td>
<td>-.052</td>
<td>.007*</td>
</tr>
<tr>
<td>2008</td>
<td>Boys and Girls</td>
<td>-.133</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Boys only</td>
<td>-.166</td>
<td>.033</td>
</tr>
<tr>
<td>2007</td>
<td>Boys and Girls</td>
<td>-.107</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Boys only</td>
<td>-.133</td>
<td>.026</td>
</tr>
</tbody>
</table>

Note: *Only in 2009 does the correlation coefficient suggest that the reading achievement scores of girls declined more than those of boys as their age at kindergarten entrance increased.

Because the data did not fit within a normal distribution, a Whitney Mann U test was conducted to investigate whether there was a significant difference between the participating school districts. This nonparametric analysis was conducted for the 2007, 2008, and 2009 school years.

The results of this study indicated that birth date and gender did not influence students’ reading achievement scores in a statistically significant way. However, after conducting a GLM analysis, the mean scores between districts did reveal statistically significant differences. A Tukey’s post hoc analysis was used to reveal districts that were significantly different (see Table 4.2). Districts with significant differences are identified with an asterisk.

Table 4.2
*Mean scores of students in each district for the years 2009, 2008, and 2007.*

<table>
<thead>
<tr>
<th>Year</th>
<th>District</th>
<th>M</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>Defiance</td>
<td>366.8</td>
<td>198</td>
</tr>
<tr>
<td></td>
<td>Evergreen*</td>
<td>413.1</td>
<td>94</td>
</tr>
<tr>
<td></td>
<td>2008</td>
<td>2007</td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>--------</td>
<td>--------</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evergreen</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Montpelier*</td>
<td>354.2</td>
<td>324.8</td>
<td></td>
</tr>
<tr>
<td>PDY</td>
<td>362.8</td>
<td>415.3</td>
<td></td>
</tr>
<tr>
<td>Pettisville*</td>
<td>412.5</td>
<td>415.3</td>
<td></td>
</tr>
<tr>
<td>Swanton*</td>
<td>375.3</td>
<td>372.0</td>
<td></td>
</tr>
<tr>
<td>Wauseon*</td>
<td>372.0</td>
<td>372.0</td>
<td></td>
</tr>
<tr>
<td>West Unity*</td>
<td>358.6</td>
<td>371.4</td>
<td></td>
</tr>
<tr>
<td>Montpelier</td>
<td>542.2</td>
<td>542.2</td>
<td></td>
</tr>
<tr>
<td>PDY</td>
<td>362.8</td>
<td>415.3</td>
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<tr>
<td>Wauseon*</td>
<td>372.0</td>
<td>372.0</td>
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</tr>
<tr>
<td>West Unity*</td>
<td>358.6</td>
<td>371.4</td>
<td></td>
</tr>
<tr>
<td>2008 Defiance</td>
<td>369.1</td>
<td>366.7</td>
<td></td>
</tr>
<tr>
<td>Evergreen*</td>
<td>405.2</td>
<td>324.8</td>
<td></td>
</tr>
<tr>
<td>PDY</td>
<td>301.8</td>
<td>415.3</td>
<td></td>
</tr>
<tr>
<td>2007 Defiance</td>
<td>366.7</td>
<td>324.8</td>
<td></td>
</tr>
<tr>
<td>Montpelier*</td>
<td>354.2</td>
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</tr>
<tr>
<td>PDY</td>
<td>362.8</td>
<td>415.3</td>
<td></td>
</tr>
<tr>
<td>Evergreen*</td>
<td>412.5</td>
<td>415.3</td>
<td></td>
</tr>
<tr>
<td>Montpelier*</td>
<td>542.2</td>
<td>542.2</td>
<td></td>
</tr>
<tr>
<td>PDY</td>
<td>362.8</td>
<td>415.3</td>
<td></td>
</tr>
</tbody>
</table>
Results of Research Question 2

RQ2. Do boys entering kindergarten from rural northwest Ohio whose birthdays occur after July 1 perform lower on the Ohio Third Grade Reading Achievement Assessment than do girls with birthdays after July 1?

H2. Boys with birthdays after July 1 will score statistically significantly lower on the Ohio Third Grade Reading Achievement Assessment than girls with birthdays after July 1.

H02. There is no statistically significant difference between the scores of boys with birthdays after July 1 and girls with birthdays after July 1 on the Ohio Third Grade Reading Achievement Assessment.

To answer the second research question, a series of independent t-tests was conducted to compare the mean scores of boys whose birthdays occur after July 1 with the mean scores of girls whose birthdays occur after July 1. Separate t-tests were conducted for all three years (2007, 2008, and 2009) independently due to the kindergarten programs changing from a half day during 2004/2005 which would be reflected in the 2007 assessment, 2005/06, reflected in the 2008 assessment, to a full time all day kindergarten in 2006/07 school year which is reflected in the 2009 assessment. An additional t-test was conducted using combined data from all three years. F-tests were conducted to determine whether the variances were equal between the mean scores of all
samples. F-tests supported that the variances were equal and a pooled standard deviation was used in each t-test (see Table 4.2).

Table 4.3
Summary of t-test Results

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>t</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007-2009 Boys</td>
<td>89</td>
<td>376.4</td>
<td>59.6</td>
<td>t(238)=0.21</td>
<td>0.46</td>
</tr>
<tr>
<td>2007-2009 Girls</td>
<td>150</td>
<td>378.2</td>
<td>65.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2009 Boys</td>
<td>34</td>
<td>377.6</td>
<td>58.9</td>
<td>t(86)=0.43</td>
<td>0.33</td>
</tr>
<tr>
<td>2009 Girls</td>
<td>54</td>
<td>383.1</td>
<td>58.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2008 Boys</td>
<td>25</td>
<td>374.4</td>
<td>69.4</td>
<td>t(76)=0.68</td>
<td>0.24</td>
</tr>
<tr>
<td>2008 Girls</td>
<td>53</td>
<td>385.5</td>
<td>65.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2007 Boys</td>
<td>30</td>
<td>376.7</td>
<td>53.5</td>
<td>t(71)=0.95</td>
<td>0.82</td>
</tr>
<tr>
<td>2007 Girls</td>
<td>43</td>
<td>361.9</td>
<td>72.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The first t-test compared the mean scores of boys (N = 89) whose birthdays occurred after July 1 with the mean score of girls (N = 150) whose birthdays occurred after July 1 on the Ohio Third Grade Reading Achievement Assessment. The first t-test combined the scores for all students in all three years (2007, 2008, and 2009). The mean score for the boys indicated a "basic" level of proficiency (M = 376.4, SD = 59.6). The mean score for the girls also indicated a "basic" level of proficiency (M = 378.2, SD = 65.6). There was no significant effect between the two groups, t(238) = -0.21, P-Value =
using the pooled standard deviation of 63.5, suggesting that gender had no effect on the younger students' scores for the combined years of 2007, 2008, and 2009.

The second t-test compared the mean scores of boys (N = 34) whose birthdays occurred after July 1 with the mean score of girls (N = 54) whose birthdays occurred after July 1 on the Ohio Third Grade Reading Achievement Assessment. The mean score for the boys indicated a "basic" level of proficiency ($M = 377.6$, $SD = 58.9$). The mean score for the girls also indicated a "basic" level of proficiency ($M = 383.1$, $SD = 58.8$). There was no significant effect between the two groups, $t(86) = -0.43$, P-Value = 0.335, using the pooled standard deviation of 58.8, suggesting that gender had no effect on the younger students' scores for the year 2009.

The third t-test compared the mean scores of boys (N = 25) whose birthdays occurred after July 1 with the mean score of girls (N = 53) whose birthdays occurred after July 1 on the Ohio Third Grade Reading Achievement Assessment. The mean score for the boys indicated a "basic" level of proficiency ($M = 374.4$, $SD = 69.4$). The mean score for the girls also indicated a "basic" level of proficiency ($M = 385.5$, $SD = 65.5$). There was no significant effect between the two groups, $t(76) = -0.68$, P-Value = 0.248, using the pooled standard deviation of 66.8, suggesting that gender had no effect on the younger students' scores for the year 2008.

The fourth t-test compared the mean scores of boys (N = 30) whose birthdays occurred after July 1 with the mean score of girls (N = 43) whose birthdays occurred after July 1 on the Third Grade Ohio Reading Achievement Does Assessment. The mean score for the boys indicated a "basic" level of proficiency ($M = 376.7$, $SD = 53.5$). The mean score for the girls also indicated a "basic" level of proficiency ($M = 361.9$, $SD = 72.5$).
There was no significant effect between the two groups, $t(71) = 0.95$, P-Value = 0.828, using the pooled standard deviation of 65.4, suggesting that gender had no effect on the younger students’ scores for the year 2007.

Based on the t-test results, there is no significant difference in the scores between boys with birthdays after July 1 and girls with birthdays after July 1 on the Ohio Third Grade Reading Achievement Assessment. Therefore, the results of this study do not support rejecting the null hypotheses for both RQ1 and RQ 2.

**Additional Findings**

Regarding RQ1, the results indicate that the students who entered kindergarten at a younger age performed better than older students. As the above table indicates, however, many students who entered kindergarten between the ages of 5.0 years and 5.5 years performed below the level of “proficient” (i.e., 400 score) on the Ohio Third Grade Reading Achievement Assessment. While the quantitative analysis indicates younger students achieved higher scores than older students, it should also be noted that in 2007, 160 students who were between 5.0 and 5.5 years of age upon entrance to kindergarten performed below 385, which is within the “limited” range, and 14 younger students performed between 385 and 400, which is within the “basic” range. The students in the lower ranges (385 and below) may be ones identified as requiring special education services, or individual education plans and remediation. Students who scored above 385 are most likely already receiving some type of reading remediation and, with some assistance, are able to achieve scores at or above the proficient rate. In 2008, 126 students between the ages of 5.0 and 5.5 scored below 385, with 14 students scoring below proficiency between 385 and 400. In 2009, 158 students scored below 385, with
22 students between 385 and 400. While the quantitative data do not support the hypotheses, there is still a majority of students (56.5%) between the ages of 5.0 and 5.5 who did not pass at the proficient score of 400. Additionally, the nonparametric analysis indicated that the only significant differences in third-grade reading achievement scores occurred among districts and that age, birth date, and gender did not impact reading achievement scores at a statistically significant level.

This study focused on whether age at kindergarten entrance would significantly affect the scores of students with birth dates after July 1 on the Ohio Third Grade Reading Achievement Assessment. The results of the analysis indicated a slight negative correlation between age at kindergarten entrance and scores on the Ohio Third Grade Reading Achievement Assessment. Contrary to expectations, students who entered kindergarten at a younger age achieved higher scores. In addition, it should be noted the only significant differences occurred between participating districts. Several possible explanations could account for these results:

First, students may have been advanced or may have come from homes rich in literacy. Strickland and Taylor (1986) stated that “children who come from homes in which storybook reading takes place have an educational advantage over those who do not” (p. 27). These students, ones who have come from homes in which books were read and interaction with print was common, would be more likely to have acquired many of the literacy skills necessary to place them at an advantage within the kindergarten classroom. These students are more than likely ones who know letter-sound associations, which would then allow them to make words out of word families, print or write letters or words, and understand concepts of print and the parts of a story. These are concepts
directly linked to Ohio Standards and what students should know upon entering kindergarten.

Secondly, these students may have attended pre-school where exposure to print, storybook reading, creative play, and developmentally appropriate activities would better prepare them for formal schooling. These students would know what to expect due to the interaction with other children in a semi-structured school-type setting. In pre-school, they would have experienced interaction with words by identifying signs or labels, identifying their names in print, practicing writing letters, and making associations between letters and objects in their environment. In pre-school early learners are learning to become literate in real-life settings. These students observe teachers or aides reading and writing, helping others write letters or words, and associating the letter with objects. Young children in their desire to please often mimic adult activities and thus learn through active engagement with positive reinforcement. The positive reinforcement encourages them to continue striving within their pre-school environment. The positive reinforcement these students receive also leaves them eager when they begin their formal kindergarten education.

Third, students within this study came from 10 different districts and may have received different literacy training from kindergarten through third grade. The literacy variables a student may have encountered may include direct instruction, where the instruction is based more on a drill-and-practice approach that lacks systematic phonics; writing across the curriculum; rich experiences with literacy; and support for the process of building a child’s thinking about text and literacy. These variables also may include instruction in creating words and describing what the words mean within the child’s
environment. If teachers engage students in leveled reading, books that match a student’s reading level, the children are able to read and understand the text. When children engage in the practice of reading books at their reading level, this practice helps children to become more proficient readers. Literacy, like many other activities, increases with practice. If students have experienced teachers who scaffold and model learning experiences in literacy, students may acquire higher-level skills which may enable them to engage in higher level literacy skills and cognitive thinking levels, such as analyzing, synthesizing, and evaluating.

Fourth, the children may have attended a full day kindergarten program where they received more content related curriculum in literacy. In full-day kindergarten programs, students participate in an approximately five-hour school day. The curriculum is designed in blocks, beginning with a group activity talking about the calendar. This activity integrates content over literacy, math, science, social studies, and social skills for approximately 40 minutes in the morning. Students practice math by counting off the days of the month. They also talk about the weather, discuss what is going on in their communities, and sing songs. Teachers often read books to students and engage them in an interactive discussion to prepare them for the theme they are working on that day or that week. Students engage in physical education or music, followed by lunch and recess, and then they begin working with the afternoon content area, which is normally a large block of math with science and social studies.

In the afternoon, depending on time during the day given to physical education and music, students will have stations built into the day. Stations are actually small learning centers. Students may be assigned to a computer learning center, where they
learn about computers; a listening center, where books on tape and books are located for student use; a science center with water/sand tables or other activities to support science lessons; or a kitchen area for role playing and socialization. With the more rigorous content being required in kindergarten, educators were often unable to cover the mandated standards and content in a 2.5-hour block. The 2009 scores reflect the first year of students who attended all-day kindergarten. Due to the increase of time, and more content being presented by teachers, it was decided to break down scores to perhaps delineate the information and isolate another independent variable.

Table 4.4
Percentages and numbers of students scoring in the various proficiency ranges on the reading achievement test for 2007, 2008, 2009, and all three years combined.

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>All Years Combined</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Limited</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Boys</td>
<td>93</td>
<td>51</td>
<td>78</td>
<td>221</td>
</tr>
<tr>
<td>Number of Girls</td>
<td>67</td>
<td>75</td>
<td>80</td>
<td>223</td>
</tr>
<tr>
<td>Percentage of Boys</td>
<td>57.76</td>
<td>41.46</td>
<td>52.70</td>
<td>51.16</td>
</tr>
<tr>
<td>Percentage of Girls</td>
<td>47.18</td>
<td>53.19</td>
<td>50.31</td>
<td>50.45</td>
</tr>
<tr>
<td><strong>Basic</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Boys</td>
<td>9</td>
<td>8</td>
<td>6</td>
<td>23</td>
</tr>
<tr>
<td>Number of Girls</td>
<td>5</td>
<td>6</td>
<td>16</td>
<td>27</td>
</tr>
<tr>
<td>Percentage of Boys</td>
<td>5.59</td>
<td>6.50</td>
<td>4.05</td>
<td>5.32</td>
</tr>
<tr>
<td>Percentage of Girls</td>
<td>3.52</td>
<td>4.26</td>
<td>10.06</td>
<td>6.11</td>
</tr>
<tr>
<td><strong>Proficient</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Boys</td>
<td>26</td>
<td>12</td>
<td>17</td>
<td>55</td>
</tr>
<tr>
<td>Number of Girls</td>
<td>33</td>
<td>11</td>
<td>14</td>
<td>58</td>
</tr>
<tr>
<td>Percentage</td>
<td>16.15</td>
<td>9.76</td>
<td>11.49</td>
<td>12.73</td>
</tr>
</tbody>
</table>
Regarding RQ2, the results indicate that the null hypothesis should not be rejected. While there was no significant difference between the mean scores of boys with birth dates after July 1 and girls with birth dates after July 1, a large number of students scored, on the average, below the passage rate of 400 on the reading achievement assessment.

Table 4.4 indicates that many students performed below the passing rate of 400. In 2007, 93 boys and 67 girls scored below 385, while 9 boys and 5 girls scored between
385 and 400. In 2008, 51 boys and 75 girls scored below 385, while 8 boys and 6 girls scored between 385 and 400. In 2009, 78 boys and 80 girls scored below 385, and 6 boys and 16 girls scored between 385 and 400. In all three years together (2007-2009), 51.16% of boys and 50.45% of girls scored in the “limited” range. In all three years combined, 23 boys and 27 girls scored in the 385-400 range, still below the passage rate.

**Summary**

Chapter 4 includes scatter plots from regression analyses comparing the ages of students who took the Ohio Third Grade Reading Achievement Assessment in 2007, 2008, and 2009 and their scores. The results suggest that no significant correlation exists between students' ages and their scores. In addition, Chapter 4 includes a non-parametric analysis to further investigate whether the district had a significant impact on third-grade reading achievement scores for 2007, 2008, and 2009. The results indicated there was a significant difference between districts, but age, date of birth, and gender did not significantly impact reading scores. Chapter 4 also includes a series of two-sample t-tests comparing the mean scores of boys whose birthday occurs after July 1 and girls whose birthdays occur after July 1. The results suggest that there is no statistically significant difference between these two groups. Therefore the null hypothesis should not be rejected.
Chapter 5

Summary, Conclusions, and Recommendations

Summary of the Problem

Vygotsky (1978) believed children’s culture and experience played an important role in how, what, and when a child acquired knowledge. Yet age, not level of development, is the determining factor for kindergarten readiness or entrance into kindergarten. Kindergarten is often the first experience a child may have with formal education and the foundation for their educational career. A number of studies have suggested that the age of kindergarten entrance plays a role in students’ overall performance (Bisanz, Dunn, & Morrison, 1995; Breznitz & Teltsch, 1989; Davis, Timble, & Vincent, 1980; Diamond, 1983; Dipasquale, Moule, & Flewelling, 1980; Gilmore, 1985; Langer, Lakk, & Seaarls, 1984; Uphoff & Maddux, 1980). For example, several studies have indicated that older children during a 12-month period will show more advancement in developmental skills than will younger children. Consequently, if older children display more advanced skills, some districts may become advantaged and be awarded a higher district standing (Vecchiotti, 2001). In addition, West, Denton, and Reaney (2001) analyzed student growth in academic skills during the kindergarten year and found that older children demonstrated a more advanced skill base in complex reading skills, such as letter-sound relationships, than younger children in kindergarten.
The ability to create words, recognize word patterns within larger words, and decode words is an important literacy skill that is, in part, determined by the age at which children enter kindergarten.

Socially, younger students may be at a disadvantage due to their maturity level upon entering a formal education program. These disadvantages in kindergarten, as noted by Dhuey and Lipscomp (2006), may have lasting effects, persisting into adulthood and appearing as differences in skill accumulation, college preparation, and the accumulation of other types of skills (e.g., leadership).

Based on the results of these research studies, many parents have made the decision to hold back children with birthdays closer to schools cutoff dates because cutoff dates are based on the age of students rather than their developmental stage. This enables these children to enter kindergarten later—i.e., when they are older (Elder, Labotsky, 2009, Vecchiotti, 2001; Crosser, 2006). The majority of these studies have been conducted within urban school districts. However, it is unclear whether students from rural school districts who are older when they enter kindergarten perform better on state-mandated reading proficiency assessments.

Because parents enroll their children in kindergarten for a variety of reasons, even though they may not be developmentally ready, additional research is needed to determine whether age at kindergarten entrance plays a role in reading proficiency in later years. Achieving reading proficiency is especially important during the first few years of elementary school since research has shown that children who do not develop adequate literacy skills fall behind their more literacy-proficient peers (Vecchiotti,S. 2001; Rathbun, A. West, J. Hausken,E. 2004; Elder, 2009).
According to Ohio Revised Code, school districts in the State of Ohio may select August 1 or September 30 as the cutoff date for children who reach the age of five years old to enter kindergarten. Because of this legislation, students in varying districts enter kindergarten at different ages and development levels, which may affect them adversely within a formal education setting and later in their educational career and vocation. Younger students may be treated differently by their peers, by their teachers, and by school administrators (Allington & Walmsley, 1995; Heaviside & Ferris, 1993; Pianta, 2006; Smith, 1989). However, those who are better prepared academically, often older or more developmentally advanced students, experience significant advantages over their younger, often less prepared counterparts because they received different treatment (Vecchiotti, 2001; West, Denton, & Reaney, 2001). With a better understanding of the role that age at kindergarten entrance plays in early literacy development, teachers, administrators, and legislators can create programs and policies that more accurately determine when children are developmentally ready to enter kindergarten and better prepare them for academic success.

**Purpose of the Study**

The primary purpose of this research study was to determine whether there is a relationship between students' reading scores on the Ohio Third Grade Reading Achievement Assessment and the age at which students who were administered this assessment entered kindergarten, particularly students whose birth dates occurred either before or after July 1.

A second purpose of this research study was to determine whether there was a statistically significant difference between the mean scores of boys with birth dates after
July 1 on the Ohio Third Grade Reading Achievement Assessment and the mean scores of girls on the same assessment. Two research questions guided the research for this study:

**RQ1.** Is there a relationship between the age at which children in rural northwest Ohio school districts enter kindergarten and their scores on the Ohio Third Grade Reading Achievement Assessment?

**H1.** There is a relationship between the age at which children in rural northwest Ohio school districts enter kindergarten and their scores on the Ohio Third Grade Reading Achievement Assessment.

**H01.** There is no relationship between the age at which children in rural northwest Ohio school districts enter kindergarten and their scores on the Ohio Third Grade Reading Achievement Assessment.

**RQ 2.** Do boys entering kindergarten from rural northwest Ohio whose birthdays occur after July 1 perform lower on the Ohio Third Grade Reading Achievement Assessment than do girls with birthdays after July 1?

**H 2.** Boys with birthdays after July 1 will score significantly lower on the Ohio Third Grade Reading Achievement Assessment than girls with birthdays after July 1.

**HO 2.** There is no significant difference between the scores of boys with birthdays after July 1 and girls with birthdays after July 1 on the third grade Ohio Reading Achievement Test.

**Summary of the Sample**

The sample for this study consisted of 2,296 third grade students who attended 10 different school districts in rural northwest Ohio and who were administered the Ohio
Third Grade Reading Achievement Assessment each May over a three-year period (2007, 2008, and 2009). The students who comprised the sample were from school districts in Defiance, Fulton, and Williams counties.

**Review of Methodology**

For the purpose of this study, the reading scores for third-grade students were obtained from the Ohio Third Grade Reading Achievement Assessment. The Success website was utilized to extract the date of birth, school district, and reading scores for students in the sample, and all personal information was kept confidential. Two statistical analyses were employed to answer the research questions.

A simple linear regression model was used to determine if there was a relationship between students’ age at kindergarten entrance and their academic performance on a mandatory state-sponsored assessment. A simple linear regression, specifically, was used to explore whether age at kindergarten entrance (independent variable) had a significant effect on the reading score (dependent variable). A score of 400 and above is considered passing on this state assessment. A General Linear Model was also used to determine whether significant differences existed among the 10 districts included in this study.

In addition, a two-sample t-test was used to determine whether there was a statistically significant difference between scores of boys and the scores of girls who were born after July 1 on the 2007, 2008, and 2009 administrations Ohio Third Grade Reading Achievement Assessment.
Research Findings

Although research has indicated that younger students develop at different rates and may not possess sufficient skills for academic success in a more content-driven and outcome-driven kindergarten (Vygotsky, 1978; National Research Council Institute of Medicine, 2000; National Institute of Mental Health, 2006; Neurons to Neighborhoods, 2000), the quantitative data analysis performed in this study did not support the hypothesis for Research Question 1—i.e., that younger students (those with birth dates after July 1) entering kindergarten in 2007, 2008, and 2009 scored lower on the Ohio Third Grade Reading Achievement Assessment. On the contrary, the results seemed to suggest that students who were younger (i.e., those born after July 1) when they entered kindergarten performed slightly better than students who were older (i.e., those born before July 1) when they entered kindergarten. However, these results should be interpreted with caution as the correlation coefficient indicating the relationship between kindergarten entrance age and reading achievement score was relatively weak. Therefore, the results for Research Question 1 failed to reject the null hypothesis.

In addition, research has indicated that young boys have been academically disadvantaged to a greater degree than young girls when they enter kindergarten at an early age (National Institute of Mental Health, 2006; Boys Adrift, 2007; Gurian, 2003; Tyre, 2008, U.S. Department of Education 1971-2004). The quantitative data analysis performed in this study did not support the hypotheses for Research Question 2—i.e., that younger boys (specifically, boys with birth dates after July 1) scored significantly lower on the Ohio Third Grade Reading Achievement Assessment than did younger girls (specifically, girls with birth dates after July 1).
While the results of the regression analyses and the two-sample $t$-tests did not support rejecting the null hypotheses of either research question, further analysis utilizing a Whitney Man U Test revealed that there was a significant difference between the mean reading achievement scores of children within various school districts for the 2007, 2008, and 2009 school years on the Ohio Third Grade Reading Achievement Assessment. The Whitney Man U Test also indicated age, birth date, and gender did not have a statistically significant impact on reading scores. Even though age, birth date, and gender did not have a statistically significant impact on reading achievement scores, existing research has indicated that environmental factors do impact development. For example, a study conducted by the National Research Council Institute of Medicine (2000) has suggested that “human development is shaped by a dynamic and continuous interaction between biology and experience” (p. 3). Similarly, Vygotsky (1978) also believed that a child’s environment and culture have a tremendous impact on their development. As a result, it is reasonable to conclude that additional contextual factors within students’ environments may impact their development and, when combined with the challenges of a content-driven kindergarten, may also influence their ability to achieve academic success.

**Implications for Action**

The results of this study have several implications for children, parents, teachers, school officials, communities, and legislators who have a vested interested in the educational outcomes of young students entering content-based kindergarten programs.

**RQ1.** First, the results of RQ1 indicated that a slight negative correlation (relationship) existed between age of kindergarten entrance and scores on the state assessment. This suggests that older students achieved lower scores on this assessment.
than did younger students. As a result, administrators should be cautious about making
decisions about enrolling younger students based on late birth dates or state and district
cutoff dates for kindergarten entrance. School officials and teachers should further realize
and support the idea that younger students may not be best served when they are
categorized based on the month of their birth, and care should be taken to keep these
students motivated and engaged in learning.

Secondly, the Ohio Department of Education has developed an early reading
assessment tool—the Kindergarten Readiness Assessment – Literacy (KRA-L)—to help
teachers identify the reading skills of students entering kindergarten. Ohio Law (Ohio
Revised Code, ORC-3301.07.15) mandates that this assessment should be administered
no sooner than four weeks prior to the beginning of the school year and no later than
October 1 of that same school year. This assessment measures important skill areas that
are important for students to become successful readers. Legislators may want to adjust
the window of administration, which would require school districts to establish a tighter
timeline and would therefore result in an earlier analysis of the level of students’ literacy
readiness.

Finally, because the results of this study indicate that chronological age is not the
best predictor of success on the Ohio Third Grade Reading Achievement Assessment,
perhaps the level of students’ literacy development would be a better measure. The
Kindergarten Readiness Assessment, if administered no sooner than two week prior to
the beginning of the school year and no later than two weeks after the first day of school,
might allow teachers to identify literacy needs sooner and develop strategies to facilitate
literacy growth more rapidly. Through the process of early identification, students can
begin to develop their literacy skills based on their actual and current developmental level, which may or may not correspond to their chronological age. Changing the Ohio Revised Code to adjust the testing window may help facilitate a child’s literacy skill base and result in a higher passage rate on state-mandated assessments.

As a result, school districts should have support from state and federal programs to evaluate students on their strengths and support student deficiencies without being penalized through standardized test results. Students should be able to fluidly move in and out of stages of literacy development with scaffold support from more experienced coaches and or teachers in order to foster their individual literacy development.

RQ2. The results of RQ2 indicated that girls who entered kindergarten with birth dates after July 1 scored slightly but not significantly higher than boys who entered kindergarten with birth dates after July 1. Additionally, the mean scores of both groups were below the state passage rate of 400. While the results indicated a slight negative linear correlation between reading assessment scores and kindergarten entrance age (i.e., younger students scoring slightly higher than older students), it should be noted that many young students (56.5%) scored below the level of proficient, or under 400 on the reading assessment. This suggests that teachers, administrators, and legislators, should adjust curriculum to meet the needs of students whose developmental level, or literacy skills, are not as developed as their counterparts who have scored higher than 400 (43.5%).

And finally, the results of this study should be of concern to parents, teachers, school leaders, and legislators because it may be connected to curriculum that is not developmentally matched to students’ level of literacy--in particular, boys. Research has
indicated boys are developmentally disadvantaged in literacy compared to girls. In general, for all young students, more effort should be made to engage students at their level of literacy development, incorporate reading materials that are matched to their individual reading levels and implement an interactive classroom rich in discovery-oriented activities.

**Limitations**

This study is subject to the following limitations:

- Participants in the sample study were not randomly selected. The sample consisted exclusively of students entering kindergarten in rural northwest Ohio.
- The sample subjects were selected based on students’ birthdays and school location.
- The number of students in the sample was limited.
- Some of the student data may have been lost because students moved from their district and region of enrollment.

**Recommendations for Future Research**

Based on the results of this study, several recommendations for further research may be made in order to expand the knowledge base related to the relationship between age and gender and their impact on kindergarten enrollment and literacy support programs. For future researchers intending to explore this topic, it is recommended that additional independent variables be included and examined in order to determine their effect on reading assessment scores. Questions to identify additional independent variables might include the following:
1. Did students attend a pre-school program prior to entrance into kindergarten?

2. What type of literacy curriculum was adopted by the board in each school district?

3. In what time frame did districts utilize the KRA-L to evaluate kindergarten readiness?

4. Did school districts provide additional literacy intervention or support, such as Title I or after-school programs, and what type of intervention or support was utilized?

5. What was the level of socio-economic status (SES) for students within each district, and what was the passage rate of younger students entering kindergarten who came from low-SES families?

6. What is the mobility rate of students within the district?

In addition to including an increased number of independent variables, a second recommendation for future research would be to use the Kindergarten Readiness Assessment – Literacy, KRA-L, which is a developmentally appropriate assessment, to measure development rather than chronological age. This would allow a more accurate representation of students’ developmental readiness to enter kindergarten and provide a more sensitive measure of students’ academic readiness than chronological age.

A third recommendation for future study would be to consider the effects of full-day and half-day kindergarten. Although conducted using data from several years, this study analyzed data from only one year that included a full-day kindergarten program (2009). Further studies on students with birth dates after July 1 who enter full-day
kindergarten programs would provide a better understanding of the impact kindergarten has on reading achievement.

A fourth recommendation would be to conduct a study within the same participating districts. This study would include the increased number of independent variables in order to better identify specifically what the significant differences between the districts were.

A fifth recommendation for future study would be to conduct the same study with an increased number of independent variables and within both urban and suburban school districts.

In addition to further quantitative study, this research area may benefit from qualitative methods as well. One recommendation for qualitative study may be to explore each district and compare the following elements: longevity of teachers, style of teaching, style of discipline, type of interaction with students and families, whether the teacher is a member of the local community and for how long, and the number of years each teacher teaching grades K-3 has taught at each grade level. A longitudinal qualitative study within those districts with historically higher mean scores may further identify significant differences.

Conclusion

This study contributes to the knowledge base related to kindergarten entrance age and early academic performance, but the results are somewhat conflicted, and therefore this study does not completely fill the research gap associated with ages of children entering kindergarten, their developmental levels, and their scores on mandated third-grade reading achievement tests. This study also contributes to the knowledge base
related to literacy differences between genders, although the results did not support evidence for rejecting the null hypothesis.

Results from this study indicate that younger students performed better on the reading section of the Ohio Third Grade Reading Achievement Assessment than older students. The results indicated no significant difference between the scores of boys and girls with birth dates after July 1. The researcher can conclude, based on the results that younger students do not show a significantly lower score on the reading portion of this test.
References


Appendix A

Letter to Superintendents

Millcreek West Unity Schools
Deborah Piotrowski, Superintendent
Wunity_s@nwoca.org
1401 West Jackson St.
West Unity, OH 43570

Dear Fellow Superintendents:

I am currently preparing research to complete my doctoral dissertation at the University of Toledo. I am interested in ascertaining possible links between early or late birth date for children entering kindergarten and achievement on the state mandated third grade reading test.

I will need to obtain information on the 3rd Grade Reading Achievement Tests for spring of 2006, and fall and spring data for years 2007, 2008, and 2009. This data will allow me to confidentially link birth date to achievement scores. The attached instructions will give you a step by step process for obtaining the data and forwarding to me. Within the instructions you will be sending the following information, birth date, gender, and third grade reading scores for 2006, 2007, 2008, 2009 which is indicated by the column identification listed.

All information about students, schools, and districts will be kept confidential through use of a numbering system. Your decision to participate or not participate in the study will not affect your relationship with the University of Toledo. If you are in agreement with my request, please forward this email to the appropriate party so they may compile the data and return to me by (date to be inserted upon approval of University of Toledo Human Subject /Social, Behavioral & Educational IRB) wunity_s@nwoca.org and dapoio@buckeye-expres.com.

Thanks you for your time and consideration.
Appendix B

Directions to Superintendents to Extract Data from Success Portal

2. Log in at Educator Workroom.
3. Select "Ohio Achievement Tests," the appropriate year and "Grade 3 Reading."
   (Please include data for Spring 2007, 2008, 2009.)
4. Under "Select a Report," choose "Download Student Files."
5. Under "Download Data Files," choose Excel.
6. Delete columns A, B, C, and D.
7. Then delete columns P-AH (2007 P-AD).
9. Then delete AD-BA 08-09 only.
10. Then delete all rows below 3rd grade with scores from grades 4-8.
11. Page setup Landscape and add gridlines.