# THE EFFICACY OF A READING REMEDIATION PROGRAM FOR ETHNICALLY AND

#### ECONOMICALLY DIVERSE AT-RISK READERS

by

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A Research Proposal Submitted in Partial Fulfillment of the Requirements of the Education Specialist Degree in

School Psychology

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May, 2006

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Author:	Anderson, Kevin S.		
Title:	The Efficacy of a Reading Remediation Program for		
	Ethnically and Economically Diverse At-risk Readers.		
Graduate Degree/ Major:	Ed.S. in School Psychology		
<b>Research Adviser:</b>	Jacalyn Weissenburger, Ph.D.		
Month/Year:	May, 2006		
Number of Pages:	71		
Style Manual Used:	American Psychological Association, 5 <sup>th</sup> edition		

#### <u>ABSTRACT</u>

A compelling body of research indicates that English language learners and/or students who live in poverty are at-risk for reading failure. This study uses data to assess the effectiveness of a mandatory, eight-week, intensive reading remediation program for English language learners and other students identified with reading failure. Results indicated that students received widespread nonsignificant gains on a repeated measure of reading achievement two months post-intervention; however students in seventh grade, students who received Title 1 services during the previous year, and Hispanic students demonstrated significant gains. Results also indicated that consistent attendance at the reading intervention produced significant gains in reading achievement. Limitations and recommendations are discussed.

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#### Acknowledgments

I would like to greatly thank Dr. Jacalyn Weissenburger for her support and guidance throughout the process of completing my Ed.S. thesis. I would also like to thank Dr. Jim Byrd and Dr. Carolyn Heitz for being on my thesis committee. Words cannot express my thankfulness and appreciation to my wife, Sandy, for her practical support, encouragement, and faithfulness in prayer on my behalf, without whom this accomplishment would never have been possible. And as for my kids, Kirsten, Anna, Britta, and Erik, they are still cool!

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#### Chapter I: Introduction

More than a quarter century of research on language development has provided a fascinating account of how closely children's language development and literacy are intertwined. Research findings indicate that literacy is closely linked with children's primary language (Bruning, Schraw, Norby, & Ronning, 2004) and their use of language in their homes, communities, and culture (Purcell-Gates, 1996; Sulzby, 1991; as cited in Bruning, et al., 2004). In most classrooms, students will reflect a broad array of exposure to reading, vary in their language backgrounds, and differ in their metalinguistic awareness in ways that affect their progress toward literacy (Bruning, et al., 2004).

Classrooms are becoming more diverse on several levels, and state and federal accountability standards present challenges that require educational innovations in reading instruction. To meet the standards, the State of Minnesota's Department of Education closely monitors every school district and every school within each district on several key variables to insure they are making Adequate Yearly Progress (AYP):

The federal law requires schools to determine whether all students and specific subgroups of students (limited English proficiency students, students with disabilities, students eligible for free and reduced price meals, and white, black, Asian Pacific Islander, American Indian, and Hispanic students) are making AYP. Schools fail to make AYP if they fail to meet or sustain specific levels of performance for all students and for each identified student subgroup. Schools also fail to make AYP if fewer than 95 percent of students in each identified subgroup are tested. (Minnesota House of Representatives, 2003)

To comply with No Child Left Behind (NCLB), the State of Minnesota utilizes the results of the Minnesota Comprehensive Assessment (MCA) to demonstrate improvement in the academic area of reading. Neither NCLB nor the State of Minnesota make any allowance or provision for students for whom English is a second language, except for those students who have become United States residents within the previous 12 months (NCLB, 2002; Walz, Thurlow, & Spicuzza, 2000).

Public schools are responsible for the education of all students who reside within their district and are not enrolled in a private school or educated in a home-school setting. This presents school districts with complex curricular challenges and competing priorities. The scope and sequence of the curriculum must satisfy state and federal standards and equip students with a minimum level of academic proficiency so they can benefit from the expectations and rigor of the next grade level. Further, schools must incorporate new students into the curriculum despite their previous educational experience or personal variables.

The curricular challenges and competing priorities within Austin Public Schools (APS), one Minnesota school district, have been intensified by recent, demographic changes. The demographic composition of APS has shifted from a relatively Caucasian/English-speaking, working/middle class community to one that has become ethnically, linguistically, and economically diverse.

Compared to national trends published in the National Center for Education Statistics (Wirt, Rooney, Hussar, Choy, Provasnik, & Hampden-Thompson, 2005) publication, *The Condition of Education in 2005*, APS is far from the norm. According to national statistics, the number of students who spoke a language other than English rose from 9 to 19% from 1979 to 2003. Of this group of multilingual students, 29 to 35% spoke English with difficulty. This

indicates that 3 to 5% of the total student population spoke English with difficulty, and these percentages have remained relatively stable from 1979 to 2003. In contrast, during the 2004-2005 school year, 14% of APS students spoke a language other than English, of which 70% spoke English with difficulty (Minnesota Department of Education, 2005c & 2005e). This indicates that 10% of APS students had difficulty speaking English, and they were defined as English Language Learners (ELL's) (Minnesota Department of Education, 2005d).

From 1979 to 2003 the number of students nation-wide who spoke another language at home and had difficulty speaking English increased by 124% (Wirt, et al., 2005). This statistic pales in comparison with the same population in the Austin Public Schools. In half the time, students with English Language Learner status increased more than five times the national rate; that is, a 660% increase (Minnesota Department of Education, 2005a; 2005b; 2005c; & 2005e).

Compared to comparably sized school districts and communities in Minnesota, APS also has a disproportionately large number of students who live in poverty. For example, within APS 13.32% of the student body come from families who live in poverty, compared to the statewide mean of 8.48% in the 346 Minnesota school districts (U.S. Census Bureau, November 2005).

The Minnesota Department of Education (MDE) tracks the number of students who are eligible for free/reduced price (F/RP) meals. The State of Minnesota's total student enrollment has remained relatively consistent (a decline of two percent across seven years), but the number of students eligible for F/RP meals has increased 10%. Similarly, the enrollment in APS has remained relatively consistent (decline of 4 percent) across the same time period; however, the number of APS students eligible for F/RP meals has increased by 40% (Minnesota Department of Education, 2005a & 2005c).

As has been demonstrated, the student body of Austin Public Schools has experienced a dramatic demographic transformation in less than a decade. Increases in the ethnic and economic diversity of the student body, and the number of students who lack proficiency in the English language create special challenges for the district as it makes efforts to raise the reading level of all students, especially those students experiencing, or at-risk for, reading failure. *Statement of the Problem* 

Approximately 30% of all APS students in each grade read below grade level (Raskin, 2004 Personal Communication). According to the No Child Left Behind Act of 2001 (NCLB) (Public Law 107-110), APS will experience sanctions and negative consequences if the district as a whole and specific subgroups fail to demonstrate adequate yearly progress (AYP). Therefore, a coalition of administrators and teachers within the Austin Public Schools developed an aggressive action plan in the 2004-2005 school year. The plan was to increase the number of students reading level at grade level from approximately 70% to 80-85%.

The aggressive action plan, an outcome-based pilot project, was implemented during the 2004-2005 school year to improve the reading skills of elementary and middle school students. At-risk students were identified and monitored through criterion-based assessments, and summer school was required for students who did not meet grade-level proficiency standards. The plan specified that identified students would be retained if they did not participate in the summer school intervention.

The overarching question is, "Did the summer school program make enough of a difference to offer it again, for whom, and in what format?" And secondarily, "How were English Language Learners and students eligible for free/reduce price meals affected by the district's action plan?"

Given that: 1) districts must demonstrate that their students are making Adequate Yearly Progress toward achieving reading proficiency due to the No Child Left Behind Act; 2) the Austin Public Schools now include increasing percentages of children from lower socioeconomic backgrounds and with English Language Learner status; 3) the Austin Public Schools have implemented curricular changes and a summer reading program to address the needs of the district's at-risk readers, and 4) administrators and educators with the Austin Public Schools must determine whether the district's recent curricular changes and interventions have had a positive impact on student's reading proficiency; a need exists to examine the effects of the district's curricular changes as well as determine the demographic factors linked with success on the Minnesota Comprehensive Assessments.

#### Purpose of the Study

This study will provide actionable information for the Austin Public School district. This information will be used to help make decisions about future programming for at-risk readers and the allocation of limited resources to meet the demands of NCLB.

#### Research Questions

This study will address the following research questions:

- Did the summer reading intervention significantly increase the reading skills of at-risk readers?
- 2. Did the early elementary students benefit more than the middle school students from the summer reading program?
- 3. What variables best predicted which students benefited from, or did not benefit from, the summer school reading program?

- Adequate Yearly Progress (AYP) minimum state and federal accountability standards for school buildings and districts to demonstrate the effectiveness of their educational programming.
- *At-Risk Reader-* an elementary or middle school student whose reading skills are more than one year below grade level as defined by norm-referenced and/or criterion-based assessments.
- Low Socioeconomic Status (SES) a student who is eligible for free or reduced price meals (F/RP).
- English Language Learner (ELL)/Limited English Proficiency (LEP) terms used interchangeably throughout this paper, as evidenced in the literature, to describe a learner who first learned a language other than English, comes from a home where a language other than English is usually spoken, or does not use English as a primary language; and lacks the necessary English skills to fully participate in classes taught in English (2005, Minnesota Department of Education); and who receives services from an English as a Second Language instructor.
- Phonemic Awareness the ability to hear, identify, and manipulate the individual sounds
  phonemes in spoken English (Partnership for Reading, 2003).
- *Phonological Awareness* a broad term that includes phonemic awareness activities that can involve work with rhymes, words, syllables, and onsets and rimes (Partnership for Reading, 2003).

#### Chapter II: Literature Review

The professional literature provides a rich contextual foundation upon which to study the efficacy of a reading remediation program for ethnically and economically diverse students. The following subsets of the professional literature are of particular relevance to this study: reading achievement gaps, the brain, the identification of at-risk readers, and reading interventions. Each subset or area will be addressed within this chapter.

#### **Reading Achievement Gaps**

The literature documents reading achievement gaps when performance by ethnic groups is compared. Despite decades of research and well-informed interventions, state (Terwilliger & Magnuson, 2005) and national (Duncan & Magnuson, 2005) studies continue to report significant achievement gaps when reading achievement test scores are compared across ethnic categories. In the era of data-based decision-making and accountability (NCLB, P.L. 107-110) and equal rights/non-discriminatory practices, ethnicity remains an important demographic variable. However, when ethnicity is reported without controlling for English language proficiency and socio-economic status (SES), the results are misleading and inadvertently perpetuate public perceptions and stereotypes of ethnic minorities (Terwilliger & Magnuson, 2005).

The literature also documents reading achievement gaps when performance by SES level is compared. In one study, for example, socioeconomic status accounted for some 20 percent of the variation in childhood intelligence quotient (IQ) estimates (Noble, Tottenham, & Casey, 2005). The negative impact of poverty/low SES on educational outcomes is certain as witnessed in hundreds of articles that document the correlation between poverty/low SES and child outcomes. Refer to Dickens, (2005); Duncan and Magnuson (2005); Skiba, Poloni-Staudinger,

Simmons, Feggins-Azziz, and Chung (2005); Brooks-Gunn, Duncan, and Britto (1999); and MacMillan and Reschly (1998) for further evidence of the negative effects of poverty/low SES on educational outcomes and reading achievement.

The literature documents reading achievement gaps when performance by level of phonemic awareness is compared. Pre-school and school age children who display chronic deficits in foundational skills necessary for language acquisition (i.e., phonemic awareness) are "the most resistant to change with instruction, and clearly most at risk for terminal school failure and dropout" (D'Angiulli, Siegel, & Maggi, 2004, p. 211). D'Angiulli et al. (2004) and Brooks-Dunn, et al. (1999) suggest that this phenomenon may be more even pronounced in children at the lower end of the SES spectrum. Stanovich (1986) refers to the Matthew Effect (after the Gospel according to St. Matthew) to describe how, in reading, the rich get richer and the poor get poorer. That is, children who demonstrate higher levels of phonemic awareness develop the ability to hear, identify, and manipulate the individual sounds that allows for the development of independent reading, high levels of practice, and fluency, all of which are critical for intellectual development, comprehension, and the enjoyment of reading.

Children without good phonemic awareness tend to fall into a downward spiral of achievement in which an initial lack of success in reading can develop into widespread cognitive deficits (Ceci, 1991). The sequence begins with large differences in reading practice. In a study of 1<sup>st</sup> grade students, Allington (1984) noted the number of words per week read ranged from 16 in the less skilled group to 1933 in the upper group. Compounding this problem of differential exposure is the finding that struggling readers often use reading materials that are too difficult for them (Stanovich, 1986). Slow, disconnected, error-prone reading of difficult material does not lead to reading fluency or comprehension. Lack of fluency and poor comprehension

frequently leads to decreased motivation, reading avoidance, academic failure and further disadvantage. Language skills such as vocabulary knowledge, general knowledge, syntactic skills, and possibly even memory, rely heavily on reading for their development. For example, Jorm et al. (1984) reported a performance difference in reading of four months in 1<sup>st</sup> grade had increased to nine months in 2<sup>nd</sup> grade in favor of the phonemically aware group (the groups had been matched in kindergarten on verbal IQ and sight word reading).

The literature also documents reading achievement gaps when performance by English proficiency is compared. Students with limited English proficiency (LEP) are at risk for school failure (August & Hakuta, 1997). In the absence of intensive reading interventions, studies have consistently documented that students with LEP score significantly lower compared to students of equal SES (Moss & Puma, 1995, cited in Slavin & Madden, 1999), and that school achievement for students with LEP, even after obtaining English language proficiency, does not attain the level of achievement demonstrated by non-LEP peers (McArther, 1993). D'Angiulli et al. (2004) reported similar findings upon kindergarten entry for students who were English language learners (ELL). The achievement gap was most pronounced for the lowest and highest SES groups. However, with literacy-intensive instruction beginning in kindergarten, these same ELL students in the lowest and highest SES groups tended to display higher levels of reading achievement when compared to non-ELL (L1, or students for whom English is their primary language) within the same SES level by third or fifth grade. The reading achievement of ELL's and L1's in the middle two SES levels was generally comparable. In addition to documenting the positive effect of literacy-intensive instruction for ELL's, D'Angiulli and his colleagues (2004) also documented the attenuation of the negative impact of SES level on reading achievement. The ELL students in the lowest SES level displayed the most noticeable results;

and, ironically in kindergarten, these same students were identified as most at risk for reading failure and/or reading disability.

The literature documents the relationship between the achievement gap and genetics. One approach is to investigate genetic differences between ethnic groups. Proponents of whitesuperiority/black-inferiority theories (Jensen, 1973) have cited genetics as their fortress from which to defend their "hereditarian [*sic*] perspective" (Dickens, 2005, p.57). Rowe, Vazsonyi, and Flannery (1994) and Jensen (1998) suggest that one half to two-thirds of the black-white achievement gap is genetic in origin, and Rushton (2000) constructed a theory to support their position.

Another approach is to investigate genetic difference within ethnic groups and find alternate explanations for the variance between ethnic groups. In contrast to the hereditarian position, Flynn (1987, 1994, & 1998) investigated the worldwide phenomenon that cognitive ability increases over time at comparable rates across ethnic groups (also known as "the Flynn Effect"). This general rise in ability is inconsistent with the hereditarian position, which would predict that the black/white achievement gap would grow. Dickens (2005) revisited Rowe, et al. (1994) and Jensen (1998) and suggested that the reported black/white achievement gap was confounded because it was primarily a measure of Gc (crystallized intelligence), a construct strongly correlated with acquired knowledge. Turkheimer, Haley, Waldron, D'Onofrio, and Gottesman (2003) reported that low SES background and its corresponding experiences and/or lack of preliterate development can so heavily influence a child's degree of achievement that the genetic makeup is nearly irrelevant in predicting academic success. Such a review suggests that interventions may be particularly successful among disadvantaged children. Dickens and Flynn (2001) argued that environmental effects, though transient, drive large multipliers and produce the same large effects as genetic differences over time. Robertson and Symons (2003) reported the experimental effect of reducing class size resulted in large increases in achievement scores, regardless of ethnicity. Numerous twin studies, especially those studies in which the twins were raised in separate homes (Moore, 1986) reveal that a:

"shared family environment plays a large role in explaining variance in cognitive ability when children are spending most of their time in the home, with their activities strongly influenced by their parents. But that effect fades as they spend more of their time away from home and in self-directed activities." (Dickens, 2005, p. 68)

Moore (1986) also reported that these results hold true even when the twins are raised in homes with different ethnicities.

### The Brain

The literature on the brain is beginning to enlighten educational interventions. Through advances in brain imaging, researchers can pinpoint areas or regions of the brain associated with specific cognitive skills necessary for reading acquisition. Inasmuch as reading acquisition is influenced by genetic predispositions, it is similarly influenced by early life experience (e.g., familiarity and/or exposure to print, the English language, pre-school educational experiences, poverty, and etc.) and educational interventions, which have been found to both raise children's scores on reading tests and increase activity in the brain regions most closely linked with reading (Noble et al. 2005). In light of recent research, this section will review reading-related cognitive structures, cognitive processes, and their corresponding neuroanatomy as a foundation for understanding the influence of experience on brain development. *Schema Theory.* Cognitive psychology provides a rich theoretical foundation upon which to consider the acquisition of early literacy skills by at-risk readers. Schemas are believed to be foundational in the process of organizing information in long-term memory. The purpose of a schema is to relate incoming information to already known information. This process of linking new information with existing knowledge structures efficiently organizes information, and schemas also allow us to predict or anticipate the continuation of both spoken and written communication (Singhal, 1998).

Researchers have identified several types of schemata. *Content schema*, which refers to a reader's background or world knowledge, provides readers with a foundation, a basis for comparison (Carrell & Eisterhold, 1983; Carrell, Pharis, & Liberto, 1989; Singhal 1998; Stott 2001). *Formal schema*, often known as textual schema, refers to the organization and forms of written texts (Carrell & Eisterhold, 1983; Carrell, 1987; and Alderson, 2000). It can include knowledge of different genres, vocabulary, grammar, and level of formality. Formal education and culture play the largest role in providing one with a knowledge base of formal schemata. *Linguistic or language schema* refers to the decoding features needed to recognize words and how they fit together in a sentence (Singhal, 1998).

Readers will understand more text when it is connected with existing information within their content, formal, and/or linguistic schema (Ammon, 1987; Johnson, 1981, 1982; Langer, Barolome, Vasquez, & Lucas, 1990; Shimoda, 1989). Further evidence from such studies also suggests that readers' schemata for content affected comprehension and remembering more than did their formal schemata for text organization. Carrell (1987) reported that subjects remembered the most when both the content and rhetorical form was familiar. However, when only content or only form was unfamiliar, unfamiliar content caused more difficulty for the readers than did the unfamiliar form. Although all the variables and factors surrounding the issues of how culture shapes background knowledge and influences reading are not fully understood, there is agreement that background knowledge is important, and that content schema plays an integral role in reading comprehension (Singhal, 1998). Overall, readers appeared to have a higher level of comprehension when the content was familiar. Given this, second language learners and children from low SES do not possess the same content schema as higher SES, first language readers. Thus, content schematic differences can result in comprehension difficulties (Singhal, 1998).

Reading is also a meaning-making process involving an interaction between the reader and the text (Grabe & Stoller, 2001). Readers use mental activities to construct meaning from text. These activities generally are referred to as reading strategies or reading skills, typically referred to as bottom-up, top-down, and integrative strategies. The bottom-up process of reading is defined as a serial model where the reader begins with the printed word, recognizes graphics stimuli, decodes them to sound, recognizes words, and decodes meanings (Alderson, 2000; Paran, 1997). Contrary to bottom-up models, top-down models indicate the reader is expected to bring background knowledge to the text via relevant schema. Grabe and Stoller (2002) and Alderson (2000) stress that top-down models assume that reading is dependent upon the reader's efficient access to prior knowledge, which, in turn, affects their comprehension of the text.

According to Singhal (1998), both top-down and bottom-up strategies are used by effective readers. Integrative strategies (Wallace, 2001; Grabe & Stoller, 2001) suggest that readers go through an ongoing process while reading which involves the continuous process of sampling from the input text, predicting what will come next, testing predictions, and confirming predictions. Effective readers do not read word for word, but rather use their background knowledge and various strategies such as predicting and confirming to comprehend text.

*Reading-Related Neuroanatomy.* Neuroscience has contributed evidence to the theoretical conceptualizations regarding the brain's involvement in the process of reading. Cognitive control, also known as executive functioning, involves several related processes such as attention, working memory, and self-control (Casey, Giedd, & Thomas, 2000). Adequate cognitive control provides foundational cognitive and social skills necessary for academic success. Cognitive control also includes the ability to ignore, tune-out, and/or not react to extraneous information and/or distractions (Noble et al., 2005).

The development of memory and learning also is clearly important to academic success. One aspect of learning is the ability to form and remember new associations among events (Noble et al., 2005). An imaging study showed that, in children and adults, the speed of learning a new association was positively correlated with activity in the hippocampus (Casey, Tottenham, & Fossella, 2002). According to Casey, et al. (2002) and Nobel, et al. (2005), cognitive control and memory and learning are general cognitive processes that a child brings to the academic environment.

The development of reading has been mapped to two areas of the cortex along the left side of the brain within the perisylvian region (McCandliss & Noble, 2003). The superior temporal gyrus is involved in phonological processing; preliterate language skills that are critical for the development of reading, (e.g., phonological awareness, or an understanding of the sounds of language) (Wagner & Torgesen, 1987). The fusiform gyrus, located along the bottom-left side of the brain, has been associated with the ability of skilled readers to perceive a written word automatically. Activity in the fusiform gyrus is positively correlated with both reading ability and age (Schlaggar, Brown, Lugar, Visscher, Miezin, & Petersen, 2002). McCandliss and Noble (2003) reported that the superior temporal gyrus and the fusiform gyrus are functionally linked because the development of the fusiform gyrus is thought to be influenced by phonological processing in the preliterate child.

Short-term memory (STM) generally refers to the short term storage of information. Working memory (WM) is a theoretical framework that refers to structures and processes used for temporarily storing and manipulating information.

The memory model proposed by Baddeley and Hitch (1974) has remained the dominant, though not exclusive (Cowan, 2005; Jones, Macken, & Nicholls, 2004; and Nairne, 2002) model in the field of working memory. In addition to more than three decades of multidisciplinary research, brain-imaging studies have mapped the components of working memory in the brain (Carter, 1998).

The Baddeley and Hitch (1974) model is composed of three main components; the central executive that acts as supervisory system and controls the flow of information from and to its slave-systems: the phonological loop and the visuo-spatial sketchpad. The slave systems are passive, short-term storage systems dedicated to the rehearsal of information within a specific content domain (verbal and visuo-spatial, respectively) (Baddeley, 1986). Recently, Baddeley (2000) added a fourth component to the model, called the episodic buffer. This component is a third storage system that links information across domains to form integrated units of visual, spatial, and verbal information (e.g., the memory of a story, event, or a movie scene). The episodic buffer is also believed to have links to long-term memory.

The majority of studies that have compared children with diverse English language and reading skills assume that short term memory is best understood as a phonological system or

what Baddeley (1986) refers to as the phonological loop (Swanson, Sáez, & Gerber, 2004). The phonological loop involves two major components discussed in the short-term memory literature: a speech-based phonological input store and a rehearsal process. Students who display difficulties in reading and second-language acquisition also have difficulties on other tasks requiring the short-term retention of ordered information (Swanson, Cooney, & O'Shaughnessy, 1998; Thorn & Gathercole, 1999), an indication of inefficient short-term memory (phonologicalrehearsal processing) (Swanson et al., 2004).

For example, rehearsing the pronunciation of a newly learned word in print would involve short term memory processing, while rehearsing the pronunciation and simultaneously continuing to read text invokes working memory processing. Empirically, the two processes have demonstrated unique contributions to reading (Swanson & Berninger, 1995); however, there is continuing debate regarding the distinctiveness of these two constructs.

#### Key Variables in Reading Failure.

One out of every three children who enters first grade is lacking the basic skills and motivation necessary for success in school (Carnegie Foundation for the Advancement of Teaching, 1991). These children are at substantial risk for early academic difficulties, and their prospects for future achievement are dramatically impacted as well (Spira, Bracken, & Fischel, 2005). Research has shown a strong relationship between the skills with which children enter school and their later academic performance (Baydar, Brooks-Gunn, & Furstenberg, 1993; Stevenson & Newman, 1986; Torgesen & Burgess, 1998; Tramontana, Hooper, & Selzer, 1988). The basic literacy skills that children learn in elementary school are the building blocks on which academic, occupational, and social success depend. If children enter school without the requisite preparation, their ability to acquire these essential literacy skills may be seriously hampered (Linan-Thompson, Vaughn, Hickman-Davis & Kouzekanani, 2003). However, schools and researchers are better at predicting good reading outcomes than poor reading outcomes (Felton & Pepper, 1995). Researchers have studied children at-risk for reading difficulties for more than 30 years. In one of the earliest publications addressing this issue, Jansky and de Hirsch (1972) included the premise that early identification would allow for effective intervention.

*Phonological Awareness.* Phonological awareness, or an understanding of the sounds of language, can be quantified through tasks such as rhyming, blending sounds, and word-sound games that assess the ability to manipulate phonemes and syllables (Noble et al., 2005). Preliterate children with more phonological awareness learn to read more quickly than children with less phonological awareness, and phonological awareness in kindergarten predicts teenage reading ability better than kindergarten reading skill (MacDonald & Cornwall, 1995). Torgesen, Wagner, Rashotte, Rose, Conway, and Garvan (1999) studied growth in reading skills for a sample of children who performed in the bottom 12% on a measure of phonological awareness in kindergarten and found that home environment (positive correlation), behavior problems (negative correlation), and phonological variables (positive correlation) were significant predictors of growth in reading skills for initially low achieving students.

The research literature provides a growing consensus regarding the fundamental elements present in students with reading deficits. Felton and Wood (1992), Rack, Snowling, and Olson (1992), and Siegel (1989) each indicate that phonological processing deficits are associated with reading problems. Numerous studies (Badian (1982, 1986, and 1988), the Center for the Improvement of Early Reading Achievement (2003), Jansky and de Hirsch (1972), Jorm, Schare, MacLean, and Matthews (1986), Mann (1984), and Wolf, Bally and Morris (1986)) report strong correlations between measures of phonological processing and later reading skills. Felton and

Brown (1990) reported that both phonological processing and speeded naming were important in the prediction of subsequent reading achievement. In Felton & Brown's study, which included wide ranges of SES and intellectual ability, the prediction of severe reading problems and superior reading skills was accurate; however, the prediction of reading outcomes for children at risk for less severe reading problems was more complicated and less accurate.

Felton and Pepper (1995) specified other risk factors that may impact a student's reading acquisition. These included, "the presence of a language disorder (semantic/syntactic), positive family history for reading problems, environmental factors (such as SES, preschool experience, home literacy), and development of beginning word identification skills" (p. 409). When Badian, McAnulty, Duffy, and Als (1990) studied a sample of students with more homogeneity (i.e., restricted ranges regarding gender, race and SES), they were able to predict reading ability from kindergarten to fourth grade with 98% accuracy using tests of phonological skills. These tests assessed the phonological skill areas of rapid naming, verbal labeling, and sound-symbol associations. Hurford, Schauf, Bunce, Blaich, and Moore (1994) reported that measures of reading (word identification and word attack) and phoneme segmentation early in the first grade were 98% reliable in predicting reading problems at the end of second grade.

As early as kindergarten, risk for reading failure is telegraphed by a student's abilities in phonological awareness and rapid naming (Felton & Pepper, 1995). Deficits in phonological awareness indicate the student has difficulty comprehending the relations between letters and sounds, important for reading and spelling unfamiliar words. Deficits in rapid naming indicate that the student may have difficulty learning the names of letters and sight words, skills necessary for developing automaticity in reading. Students with deficits in both areas are at the

highest risk for reading problems. In first grade, additional skills are important to evaluate, including letter naming, sight word reading, and nonword decoding (Felton & Pepper, 1995).

According to Stanovich (1993a), phonological awareness is a foundational ability underlying the learning of spelling-sound correspondences. Although phonological awareness appears to be a necessary condition for learning to read (children who do not develop phonological awareness do not go on to learn how to read well), it is not a sufficient condition. Adams' (1990) review suggests that it is critical for children to be able to link phoneme awareness to knowledge of letters.

*Experience and brain development.* In addition to phonological awareness, new research is beginning to focus on the specific brain functions that link childhood experiences with the developing brain and reading achievement. Noble et al. (2005) found the following:

Specifically, children's performance in tasks tapping the left perisylvian (language) system and the prefrontal (cognitive control) system varied widely according to their socioeconomic status, while their performance in tasks involving other systems showed either no differences or non-significant trends. The effects on the language and cognitive control systems were quite large. For the left perisylvian (language) system, the mean score of the group of middle-class children was 1.1 standard deviations higher than the mean score of the poorer children; for the prefrontal (cognitive control) system, the difference was 0.68 standard deviation. (p. 76)

On certain reading tasks, both SES and phonemic awareness accounted for unique variance, and the relationship between SES and phonemic awareness was clarified (Nobel et al., 2005). When children had high levels of phonemic awareness, they read well regardless of SES. However, when children had low levels of phonemic awareness, higher SES children read

relatively well while lower SES children struggled (Noble et al., 2005). In the Noble and colleagues study, SES was a moderating variable on the contribution phonemic awareness made to reading achievement.

*Stress.* Children raised in chronically stressful settings produce increased or irregular levels of a stress hormone (Gunner, 2000). Further, stress-related conditions have been linked to reduced hippocampal volume over time (Bremner, Randall, Scott, Bronen, Seibyl, Southwick, Delaney, McCarthy, Charney, & Innis, 1995).

Lupien, Fiocco, Wan, Maheu, Lord, Schramek, and Tu (2005) studied the effects of stress on young adults and children between the ages of six and fourteen. An acute increase in cortisol, a stress hormone, can lead to reversible memory impairments in young adults. Lupien and colleagues compared the cortisol levels of children. They found children from low SES had higher cortisol levels than children from higher SES. Further, Brooks-Gunn, Klebanov, and Duncan (1996) reported that the stressful life conditions associated with low SES and the lack of emotional support in the home accounted for a significant portion of the variance on measured reading skills. Other variables, such as maternal education, family structure, prenatal care, infant health, nutrition, and mother's age, had no or a non-significant effect on reading achievement in the Brooks-Gunn et al. study. Twin studies revealed that violence in the home is linked with lower IQ when genetic effects are taken into account (Koenen, Moffitt, Caspi, Taylor, & Purcell, 2003). Given the critical role of the hippocampus in learning and memory, it is not surprising that changes in hippocampal activity caused by prolonged exposure to elevated stress hormone may lead to deficits in learning (Noble et al., 2005; Casey et al., 2002).

Conversely, Kim-Cohen, Moffitt, Caspi, and Taylor (2004) reported that both genes and environmental factors contribute toward cognitive resilience, moderating the effects of low socioeconomic status. Adoption studies also have shown that the socioeconomic backgrounds of both biological and adoptive parents are independent predictors of adopted children's IQ, reflecting genetic and experiential influences on the child, respectively (Capron & Duyme, 1989). Thus, cognitive resilience may have a corresponding positive impact on reading achievement.

#### **Reading Interventions**

Researchers have sought to discover if students of all ages benefit from reading interventions or if the benefits are restricted to a narrow window up to 2<sup>nd</sup> or 3<sup>rd</sup> grade. Spira et al. (2005) found that children's level of reading achievement is determined early in their school experience. This finding reinforces previous research establishing the importance of implementing change early on in the learning cycle (Slavin, Karweit, & Wasik, 1994). According to Spira et al., the level of reading ability that children have attained is likely to remain relatively stable by third grade. It is difficult to escape a pattern of failure that has lasted throughout a large part of elementary school. In fact, Kennedy, Birman, and Demaline (1986) suggested that remedial programs have few, if any, effects on students beyond the third grade. If children do not acquire the skills they need to read at grade level by the beginning of third grade, they are unlikely to acquire them later on.

The stability of reading difficulties is not absolute; some studies have found that some children who exhibit reading failure at school entry can show improvement during the later years of elementary school. For example, Phillips, Norris, Osmond, and Maynard (2002) found that of children who were classified as below-average readers in first grade, roughly 50% were reading at the average level by sixth grade. Phillips et al. (2002) rebutted Juel's (1988) findings of reading status immutability by showing that the probability of being a poor reader in both first

and sixth grades is no more than .50 as compared to .88 between first and third grades as reported by Juel. In the Phillips and colleagues study, almost half the children who were below average in first grade were in the average achieving group by sixth grade, presumably due to usual exposure to the curriculum and instruction.

Cunningham and Stanovich (1997), in a longitudinal study of children from 1<sup>st</sup> through 11th grades, found a strong connection between the speed of reading acquisition in first grade and 11th-grade reading comprehension, vocabulary, and general knowledge. However, third and fifth-grade reading levels were far more potent predictors of 11th-grade print exposure than firstgrade reading. In their discussion, Cunningham and Stanovich (1997) raised the possibility that children who catch up after an initial lag in first grade may attain typical levels of reading engagement later on (Spira et al., 2005).

*Curriculum and instruction.* Longstanding curricular debates between proponents of the basal approach and the whole language approach to reading instruction have become commonly referred to as "reading wars." Jeynes and Littell (2000) performed a meta-analysis of studies that examined the effect of whole language instruction compared to basal instruction for low-SES students. Results indicated that ... "for low-SES primary-grade students, the basal approach is superior to the whole language approach in terms of student performance on standardized tests" (p. 30-31).

D'Angiulli et al. (2004) confirmed previous research that effective instruction programs with positive long-term effects for children with diverse linguistic and socioeconomic backgrounds include explicit and intensive teaching (Foorman & Torgesen, 2001) and systematic student assessment (Hakuta, 1999). According to many, explicit instruction and systematic assessment are essential features of classroom instruction aimed at promoting reading success for both L1 and ELL children (D'Angiulli et al., 2004).

Nunnery, Ross, and McDonald (2006) reported that classrooms exhibited significantly higher growth rates than those in the control group classrooms when they used Accelerated Reader and Reading Renaissance. The effect size estimates were higher in lower grade levels: +0.36 in third grade, +0.16 in fourth grade, +0.09 in fifth grade, and +0.09 in sixth grade. The effect size estimates reported by Nunnery et al. (2006) are similar to the effect size estimates reported by Borman, Hewes, Overman, and Brown (2003) in their side-by-side comparison of several comprehensive school reform (CSR) programs aimed at increasing reading achievement. Borman et al. (2003) reported the following effect size estimates: d = +0.15 for Direct Instruction, d = +0.05 for the School Development Program, and d = +0.18 for Success For All.

Frechtling, Zhang, Rockville, and Silverstein (2006) concluded that the Voyager Universal Literacy System, a pre-literacy initiative, is especially well suited to provide students in urban environments with early reading skills. Overall, students using the Voyager program showed significantly greater gains when compared to a control group in letter identification, phonological awareness, and other emerging reading skills, with effect sizes ranging from 0.23 to 1.32. The results also indicate that when Voyager program was implemented with greater fidelity to the prescribed plan, the result was larger gains in literacy scores.

Collier and Thomas (2004) studied the effect on students (n = 1,599) from Houston Independent School District whose parents chose to place them in the English mainstream with no bilingual or ESL support against the recommendation of the school district. At first, the students were on grade level in second grade; however, with each succeeding grade as the curriculum became more cognitively demanding, this group's achievement scores steadily declined. By the 11<sup>th</sup> grade, those students remaining in school were scoring at the 25<sup>th</sup> NCE (12<sup>th</sup> percentile), but the majority of this group did not complete high school. In contrast, other ELL's who received either transitional bilingual education or content ESL and/or dual language instruction came closer to closing or did close the achievement gap (Slavin & Cheung, 2004; Collier & Thomas, 2004). Collier and Thomas (2004) warned that the curricular mainstream may appear to speed child's acquisition of basic English; however, it does not lead to long-term academic success in English.

Slavin and Cheung (2004) studied reading remediation programs with a wide variety of students, including ELL's. They found that Success for All (Slavin & Madden, 2000, 2001), Direct Instruction (Adams & Engelmann, 1996), and Reading Recovery (Pinnell, Lyons, DeFord, Bryk, & Seltzer, 1994) were successful with both ELL and English-dominant students. These programs seemed to work well for English language learners because appropriate accommodations, such as vocabulary instruction, language development, and programs emphasizing cooperative problem solving in small groups were built into the program.

Jesse, Davis, and Pokorny (2004) examined the characteristics of middle schools in which Latino students from low-income families made substantial achievement gains. The middle schools were characterized by strong leadership; a clear focus on achievement; a positive climate, including supportive relationships among students and teachers; and good communication with parents. Surprisingly, little attention was paid to providing culturally relevant curriculum or bilingual instruction. Apart from identifying that these schools could be further improved by drawing more explicitly on the student's cultural knowledge of home and community, no explanation was provided for this aberrant finding. *Phonological awareness.* Phonological awareness training provides the student with explicit instruction toward the goal of developing an awareness of speech sounds in words. These speech sounds include rhyming, segmenting words into beginning, middle, and ending sounds, and blending sounds to make words. Most studies reviewed referred to "a large body of research" which documents the effectiveness of phonological awareness training in facilitating the acquisition of beginning reading skills (Adams, 1990; Blachman, 1984; Bradley & Bryant, 1983; Foorman, Francis, Novy, & Liberman, 1991; Fox & Routh, 1980; Juel, 1988; Juel, Griffith, & Gough, 1986; Liberman, 1973; National Institute of Child Health and Human Development, 2000; National Research Council, 1998; Share & Stanovich, 1995; Stanovich, 1993b, 1986; Stanovich, Cunningham, & Cramer, 1984; Torgesen, Morgan, & Davis, 1992; and Wallach, Wallach, Dozier, & Kaplan, 1977).

Ball and Blackman (1991) studied the impact of direct instruction on phonological awareness training, specifically segmentation skills. In contrast with a comparison group that only received training in sound-letter patterns and a control group that received no instruction, the group that received training in both segmenting words into phonemes and in sound-letter patterns performed significantly better on measures of reading and spelling than the other two groups. Letter-sound associations did not produce phoneme segmentation skills without instruction, and neither did letter-sound associations improve beginning reading skills apart from segmentation skill training. According to the Ball and Blackman results, segmentation skills must be taught directly.

The effect and type of early reading instruction was assessed for children with poor phonological processing skills in studies by Brown and Felton (1990) and by Felton (1993). The impact of code-based instruction (which stressed sound-letter patterns) and context-based instruction (which stressed meaning with context and the use of picture clues for word identification) was studied. The code-based condition resulted in students, who at the end of the first and second grade years, out-preformed students who were assigned to the context-based condition on all measures of reading and spelling. In addition, and most important to these researchers, the students in the code-based condition, regardless of the severity of their phonological processing difficulties, understood and were able to apply the alphabetic principle to reading words. Within the context-based condition, several children failed to develop even the most basic understanding of the relationship between letters and sounds.

Other success factors. According to Buckner, Mezzacappa, and Beardslee (2003), educational interventions have been designed that specifically target cognitive control. Cognitive control was found to be the single best predictor of resilience among high-risk children, even controlling for age, gender, negative life events, chronic strain, abuse, nonverbal IQ, self-esteem, parental monitoring, and emotional support (Buckner et al., 2003).

According to Swanson et al. (2004), language-specific memory performance in Grade 1 predicts language-specific reading performance in Grade 2. For L1 Spanish-speaking students, short-term memory deficits were observed within the Spanish-language system, not the English language, where the majority of differences between the two reading groups emerge. In addition, these children showed less growth on measures of Spanish phonological processing (i.e., Spanish pseudoword task), suggesting that a language-specific phonological system was involved. Phonological processing may prove to be an important basis for differentiating ELL's at risk for a learning disability from those who are experiencing general difficulty acquiring English (Swanson et al., 2004). This review noted that gaps in reading achievement exist for a wide variety of reasons. Researchers and theorists posit varied and occasionally conflicting explanations for the disparity in reading achievement especially when considering the variables of ethnicity, income level, and English language proficiency. A finding that currently faces no opposition is that deficits in phonemic awareness are causally linked to deficits in reading achievement.

Researchers have studied and mapped the brain as it relates to the processes of reading, of which reading acquisition is but one specialty. Relatively recent brain-based research highlights the positive and negative effects that poverty, stress, education, and other life experiences has on the developing brain, and, therefore, on reading achievement. This literature has identified that students who are English Language Learners and students from families with low income are at higher risk for reading failure than other same-aged peers.

This literature review also summarized several reading interventions that hold promise for increasing the reading achievement of students who are experiencing reading failure. Of particular relevance for this study are the findings indicating that the effectiveness of reading interventions decreases after grade three; however, the literature also provides exceptions to this reported finding.

In summary, this literature review provides a broad foundation upon which to examine the effectiveness of one district's summer reading remediation intervention. Of particular interest in this study are the sub-groups identified as at-risk for reading failure: English Language Learners and students from low-income homes. This study addresses the effectiveness of a reading intervention across the elementary and middle school grades.

#### Chapter III: Methodology

This chapter will include information about how the sample was selected, a description of the sample, a description of the summer school intervention, and a description of the instruments used. In addition, the data collection and data analyses procedures are described.

#### Settings and Participants

One hundred and nine students who participated in the summer reading intervention and who attended Sumner Elementary School (total student enrollment of 385) and Ellis Middle School (total student enrollment of 1,126) during the 2004-2005 academic school year were the participants in this study (refer to Tables 1 & 2). The study was limited to second through seventh grade students who attended Sumner Elementary School and Ellis Middle School because these schools collected assessment data during the year (2003-2004) preceding the district-wide implementation of the reading performance assessments.

#### Summer Intervention

The summer school curriculum was purposely selected to provide a distinct contrast from the Harcourt (2005) basal reading series adopted by APS. The district's basal reading series was developed to provide a developmental reading/language arts program containing the following components: phonemic awareness instruction, explicit phonics instruction, direct reading instruction, guided reading strategies, and state-of-the-art assessment tools (Harcourtschool, 2006). As described by Gibson and Harder (2006), the Director of Curriculum and Instruction and the Principal of Sumner Elementary, the summer curriculum included a variety of resources from the Great Source Education Group and teacher-driven materials. The focus for the summer reading intervention typically included the following skill components: oral language development, reading comprehension, vocabulary development, phonics/word study, and reading fluency. Students were assigned to leveled classrooms based on their reading achievement scaled scores on the Scantron ACHIEVEMENT Series<sup>™</sup> (Scantron Corporation, 2004) administered during late spring of 2005. The print media were presented in colorful, high-interest theme magazines, rather than in books. The skill development of the students was monitored informally on a daily or weekly basis, and traditional tests were not utilized.

The reading intervention was one component of a 30 school day, 120-hour summer school program. Approximately two hours per day were allocated to the reading intervention. Although summer school was mandatory, attendance varied. The summer school was fully funded, and transportation was provided at no cost to participating families.

# Table 1

# **Population Characteristics**

	Demographic	N	Percentage of N
Gender			
	Female	732	48
	Male	779	52
Grade			
	2	61	6
	3	73	7
	4	80	8
	5	64	6
	6	373	37
	7	358	35
Ethnicity			
	African American	86	6
	American Indian	6	.4
	Asian/Pacific Islander	41	3
	Caucasian	1116	74
	Hispanic	262	17
English Language Learner			
0 0	No	1311	87
	Yes	200	13
Title 1			
	No	1297	86
	Yes	214	14
Meal Assistan	ce		
	N	1442	95
	Y	69	5
100			
IEP	N	101-	
	N	1317	87
	Y	194	13
Sample Characteristics

	Demographic	n	Percentage of n	Percentage of N
Gender				
	Female	47	43	6
	Male	62	57	8
Grade	2	11	10	10
	2		10	18
	3	10	14	22
	4	13	13	16
	5	10	14	25
	0	33	32	9
	1	18	16	5
Ethnicity				
·	African American	14	2	16
	American Indian	0	0	0
	Asian/Pacific Islander	6	6	15
	Caucasian	58	53	5
	Hispanic	31	28	12
English I and	1909 Learner			
English Lange	No	77	71	6
	Vac	37	20	16
	105	52	27	10
<b>T1</b> 1				
litle l	NI-	(0	(2)	F
	NO	69	63	3
	Yes	40	37	19
Meal Assistan	ce	(0)	(0)	-
	N	68	62	5
	Y	41	38	59
*55				
IEP	N	~-	~~	_
	N	87	80	7
	Y	22	20	11

#### **Instrumentation**

The Scantron ACHIEVEMENT Series<sup>™</sup> (Scantron Corporation, 2004) was used to assess student reading performance in grades two through seven. ACHIEVEMENT Series is an online standards-based adaptive measurement, and it uses a computer adaptive testing engine that relies upon Item Response Theory (IRT) calibration. The computer adaptive testing engine ensures that all content units are covered, and the publisher uses the IRT-based item bank of questions and difficulty indices to establish the assessment's reliability and accuracy.

The ACHIEVEMENT Series is designed to measure individual performance; therefore, it is a criterion-referenced test. The data used in this study are presented as scaled scores (Scantron Corporation, 2004). These scaled scores are linked to beginning, middle, and end of year grade achievement goals.

### Data Collection Procedures

Permission to use the school district data was obtained from the superintendent of the Austin Public School District. Available student records from the 2004-2005 and 2005-2006 school years were de-personalized and analyzed to determine the effects of a summer school reading remediation program for the district's at-risk readers. To be included in this study, each student must have completed at least one ACHIEVEMENT Series reading assessment prior to the summer reading intervention and at least one ACHIEVEMENT Series reading assessment following the summer reading intervention.

The primary investigator was blind to the personally identifying information. No personal contact was made with any of these students outside the scope of the primary investigator's responsibilities as a school psychologist.

### Data Analysis

This study involved the synthesis and analysis of several existing data sets of elementary and middle school students with the Austin Public Schools to answer the three research questions. Demographic information and criterion-based reading assessment data were used in the data analyses. Due to the investigative nature of this study, a liberal p value of .05 was adopted to determine statistical significance for all three research questions.

The first research question addressed the effectiveness of the summer reading intervention. To examine the effectiveness of the intervention, a paired samples *t* test procedure was implemented to compare the pretest and posttest results on the ACHIEVEMENT Series test for those students who attended the summer school reading program.

The second research question addressed whether early elementary students received more benefit than the middle school students from the summer reading program. To examine potential differences between younger and older students, the data was grouped into three catagories (i.e., grades two and three = group one, grades four and five = group two, and grades six and seven = group three). The difference scores (the degree of improvement or decrement between the two testing times) for each group was compared through repeated-measures analysis of variance (ANOVA).

The third reseach question addressed whether a variable, or variables, could be identified that would predict which students benefitted from the summer reading intervention. To examine this question, direct logistic regression analyses were used to identify those variables (i.e., gender, grade level, ethnicity, ELL status, Meal Assistance status, special education status, and summer school attendance) that predicted student success on the ACHIEVEMENT Series posttest after participating in the summer school program.

#### Chapter IV: Results

One hundred and nine students in grades two through seven comprised the sample for this research study. The purpose of this study was to determine the effects of a summer reading intervention on the reading skills of at-risk readers. The effects of the summer school intervention and grade level on reading skill gains were explored, as well as the existence of variables that may predict positive and/or negative outcomes to the reading intervention.

### Research Question One

Research question number one asked if the summer reading intervention significantly increased the reading skills of the at-risk readers. This question was examined through paired samples *t* tests. Table 2 reveals widespread nonsignificant differences based on comparing the pre-intervention and the fall post-intervention scale score means. In contrast, Table 3 reveals several positive and significant differences based on comparing the pre-intervention and post-intervention scaled score means in January.

When the intervention effects were examined by grade level in the fall, positive results from the intervention were found for only the seventh grade students (t(15) = 2.89, p = .037). Other results indicated positive effects for the Hispanic (t(28) = 2.05, p = .050) and Title 1 (t(62) = 2.53, p = .014) students in the fall. Further, positive fall effects were realized by students who attended the summer school intervention program 26 days or more (t(41) = 2.93, p = .006).

When the variable of each grade was examined in isolation, positive results were found in January for two out of the six grade levels studied. Out of the total sample, third grade (t(14) = 3.803, p = .00) and seventh grade (t(15) = 2.37, p = .03) students demonstrated significant increases in their reading achievement scaled scores from the pre-intervention period (before summer) to the post-intervention period (January in the following year). Further, results indicate

that second grade (t(10) = 2.22, p = .051) and fourth grade students (t(11) = 2.17, p = .053) nearly met the criterion for determining statistical significance. In addition, the January results indicate that students who attended the summer program 26 or more days increased their reading scores significantly (t(41) = 5.02, p = .00) over the five month period. Other results indicated students with IEPs (t(17) = .12, p = .91), students in fifth grade (t(12) = .58, p = .57), and students in 6<sup>th</sup> grade (t(28) = .1.64, p = .11) did not demonstrate significant gains in their reading scores between the pre-intervention period (April - May) and January.

# Effect of Summer Intervention on Fall Reading Skills

Variable		M <sup>a</sup>	M <sup>b</sup>	SD Paired Di	SE fferences	t	df	*p < .05 (2-tailed)
Gender	Female	2443	2499	190.454	28.39	1.972	43	.055
	Male	2349	2361	214.439	28.40	.450	56	.655
Grade								
	2	1 <b>969</b>	2032	189.894	57.25	1.105	10	.295
	3	2178	2136	167.243	43.18	963	14	.352
	4	2399	2358	87.830	24.36	-1.680	12	.119
	5	2451	2405	170.669	44.06	-1.035	14	.318
	6	2492	2551	206.025	36.42	1.617	31	.116
	7	2613	2770	274.024	68.51	2.287	15	.037*
Ethnicity								
	African	2313	2304	271.80	78.46	112	11	.913
	Asian/Pacific	2143	2328	239.63	107.16	1.724	4	.160
	Caucasian	2479	2479	166.66	22.27	.009	55	.993
	Hispanic	2293	2378	221.56	41.143	2.045	28	.050*
ELL								
	No	2457	2475	182.199	21.33	.861	72	.392
	Yes	2223	2289	252.228	46.84	1.404	28	.171

Variable		M <sup>a</sup>	M <sup>b</sup>	SD Paired Di	<u>SE</u> fferences	t	df	* <i>p</i> < .05 (2-tailed)
Title 1				-				
	No	2296	2267	162.269	25.984	1.133	38	.264
	Yes	2448	2518	219.251	27.623	2.526	62	.014*
Meal Assistance								
	No	2383	2419	230.151	28.769	1.225	63	.225
	Yes	2402	2428	154.135	25.004	1.044	37	.303
IEP								
11.71	No	2422	2456	208.413	23.015	1.553	81	.124
	Yes	2260	2276	191.038	42.717	.371	19	.715
Attendance (Days/30)								
(,, _,	0 Days	2430	2461	201.738	55.952	.547	11	.594
	1 -10 Days	2334	2326	154.079	50.360	.151	5	.883
	11 -20 Days	2525	2508	215.480	47.022	.369	19	.716
	21 - 25 Days	2460	2418	173.172	42.000	.980	15	.341
	26 - 30 Days	2295	2390	210.52	32.412	2.927	41	.006*

<sup>a</sup>(Pre-test); <sup>b</sup>(Post-test, Fall)

\**p* < .05

Variable		M <sup>a</sup>	M <sup>b</sup>	SD Paired Di	SE fferences	t	df	*p < .05 (2-tailed)
Gender								
	Female	2465	2583	168.331	25.37	4.641	43	.000*
	Male	2340	2443	244.586	33.92	3.055	51	.004*
Grade								
	2	1969	2118	222.298	67.03	2.222	10	.051
	3	2156	2352	200.069	51.66	3.803	14	.002*
	4	2386	2498	179.071	51.69	2.170	11	.053
	5	2389	2418	179.030	49.65	.579	12	.573
	6	2604	2665	200.542	37.24	1.641	28	.112
	7	2557	2713	263.137	65.78	2.369	15	.032*
Ethnicity								
	African	2300	2491	248.772	71.81	2.661	11	.022*
	Asian/Pacific	2147	2400	1 <b>48.5</b> 61	66.44	3.808	4	.019*
	Caucasian	2475	2551	199.090	27.35	2.800	52	.007*
	Hispanic	2332	2446	219.392	43.03	2.640	25	.014*
ELL								
	No	2468	2577	203.470	24.50	4.443	68	.000*
	Yes	2216	2329	236.849	45.58	2.486	26	.020*

# Effect of Summer Intervention and Fall Curriculum on January Reading Skills

Variable		$M^{a}$	M <sup>b</sup>	<u>SD</u>	SE	t	df	* <i>p</i> < .05
				Pairea Di	gjerences			(2-tailed)
Title 1								
	No	2471	2577	229.974	29.45	3.597	60	.001*
	Yes	2268	2385	179.698	30.37	3.866	34	.000*
Meal								
Assistance	No	2417	25559	193.754	31.85	4.477	36	.000*
	Yes	2385	2474	222.026	28.91	3.104	58	.003*
TED								
ler	No	2432	2566	197.401	22.35	5.993	77	.000*
	Yes	2246	2252	246.998	58.22	.116	17	.909
Attendance								
(Days/30)	0 Days	2400	2544	255.195	73.67	1. <b>957</b>	11	.076
	1 -10 Days	2289	2414	197.185	80.50	1.553	5	.181
	11 -20 Days	2578	2590	193.852	43.35	.300	19	.768
	21 - 25 Days	2419	2465	137.601	34.40	1.34	15	.202
	26 - 30 Days	2317	2486	218.102	33.65	5.020	41	*000

<sup>a</sup>(Pre-test); <sup>b</sup>(Post-test, January)

\**p* < .05

### **Research Question Two**

The second research question asked if the early elementary students benefitted more than the middle school students from the summer reading program. This question was examined through repeated-measures analysis of variance (ANOVA) comparing the younger elementary group (second and third grade), the older elementary group (fourth and fifth grade), and the middle school group (sixth and seventh grade) across three measurement periods.

ANOVA results indicate significant main effects for the groups (F(2, 86) = 30.99, p = .000) and the intervention (F(2, 85) = 16.94, p = .000). Further, a significant interaction effect was found (F(4, 172) = 3.48, p = .009).

Pairwise comparisons of the cumulative grade group means demonstrate that the younger elementary group produced significantly (p = .001) lower mean reading scores (M = 2136.31, SE = 52.29) than the older elementary group (M = 2418.28, SE = 53.37). Further, the older elementary grade group produced lower mean reading scores than the middle school group (M = 2659.46, SE = 41.34, p = .002). Other ANOVA pairwise comparison results indicate the total student group only demonstrated significant reading gains (p = .000) between the pre-intervention period (M = 2365.32, SE = 32.36) and the January period (M = 2475, SE = 31.73).

As indicated, significant interaction effects were found (refer to Table 5 and Figure 1). From spring (pre-intervention) to fall (two months post-intervention), only the middle school group demonstrated significant reading gains (t(47) = 2.73, p = .009). From fall to January (five months post-intervention), only the early elementary school group (t(25) = 4.30, p = .000) and the upper elementary group (t(23) = 3.45, p = .002) demonstrated significant reading gains (t(23) = 3.45, p = .002). Results suggest that the summer school reading intervention had more of an immediate postive impact on the middle school student group. Further, the data indicate the early elementary and upper elementary groups were most likely to demonstrate substantial reading gains from fall to January than the middle school group.

# Effects of Grade Group and Intervals on Reading Scores

Source	df	SS	MS	F	р
Between subjects	88	17638364.18			
Grade Groups (G)	2	12715740.30	6357870.15	30.99	.000*
Ss w/in groups**	86	4922623.78	205097.258		
Within subjects**	178	1246352.50			
Intervals (I)	2	623176.25	311588.125	16.94	.000*
I x G	4	255767.63	63941.91	3.476	.009*
I x Ss within groups**	172	367408.62	18394.153		
Total	266	3163794.34	<u> </u>		

\**p* < .05.



Figure 1. The effects of grouped grades on reading scores of the at-risk readers over time.

### **Research Question Three**

Research question number three examined those variables that were likely to predict which students benefited from the summer school reading program. To examine this question, direct logistic regression analyses were used to identify those variables that predicted student success (defined as an increase of scaled score gains greater than the mean scaled score gain when comparing the pre-intervention measure with the two post-intervention periods). These logistic regression procedures were implemented using the binary stepwise forward (conditional) approach.

Table 6 contains a summary of logistic regression analyses from the examination of reading achievement scaled score gains from spring to fall as a function of selected personal and educational variables (i.e., ethnicity, grade, attendance, special education status, socioeconomic status, language status, and title one status). Results indicate only grade level, ethnicity, and attendance (summer school) entered as significant predictor variables of reading gains from spring to fall. Using grade level, ethnicity, and attendance as predictor variables, the model correctly classified whether significant gains were observed in the data 74.5% of the time at step three.

Further examination of the spring to fall mean scale score changes per predictor group reveal that seventh grade (mean gain = 156.69; t(15) = 2.89, p = .037) and Hispanic (mean gain = 84.14; t(28) = 2.05, p = .050) students displayed significant gains at two months postintervention. In addition, students who attended the summer school intervention program 26 of 30 days or more (mean gain = 93.41; t(41) = 2.93, p = .006) realized positive effects during the same time period.

Table 7 contains a summary of logistic regression (binary stepwise forward (conditional))

analyses from the examination of reading achievement scaled score gains from spring to January as a function of the same personal and educational variables. Results indicate no variables entered as significant predictors of significant reading scale score gains at five months postintervention. Thus, using those variables as predictors, the model correctly identified only 51% of the cases.

	Variable	В	SE <i>B</i>	Wald	df	Sig.	Exp(B)
Step 1		·					
	Ethnicity			9.109	3	.028*	
	Ethnicity (1)	-2.251	.868	6.734	1	.009*	.105
	Ethnicity (2)	236	.993	.057	1	.812	.789
	Ethnicity (3)	-1.077	.447	5.100	1	.024*	.341
	Constant	.642	.391	2.699	1	.100	1.900
Step 2							
	Grade			10.805	5	.055	
	Grade (1)	042	.864	.002	1	.961	.958
	Grade (2)	-1.305	.809	2.607	1	.106	.271
	Grade (3)	-2.338	.978	5.712	1	.017*	.097
	Grade (4)	-1.839	.829	4.918	1	.027*	.159
	Grade (5)	.625	.675	.856	1	.335	.535
	Ethnicity			7.763	3	.051	
	Ethnicity (1)	-2.123	.912	5.417	1	.020*	.120
	Ethnicity (2)	.028	1.091	.001	1	.980	1.028
	Ethnicity (3)	-1.070	.511	4.381	1	.036*	.343
	Constant	1.524	.667	5.225	1	.022*	4.592

Logistic Regression Analyses Examining the Effect of Personal and Demographic Variables on Score Gains at Two Months Post-Intervention (n = 102)

	Variable	В	SE B	Wald	df	Sig.	Exp(B)
Step 3							·
	Grade			12.282	5	.031*	
	Grade(1)	-0.276	0.960	0.083	1	.774	0.759
	Grade(2)	-1.622	0.907	3.199	1	.074	0.197
	Grade(3)	-2.827	1.072	6.951	1	.008*	0.059
	Grade(4)	-2.172	0.914	5.646	1	.017*	0.114
	Grade(5)	-0.619	0.744	0.692	1	.406	0.539
	Ethnicity			9.149	3	.027*	
	Ethnicity(1)	-2.518	1.022	6.069	1	.014*	0.081
	Ethnicity(2)	-0.506	1.117	0.206	1	.650	0.603
	Ethnicity(3)	-1.438	0.573	6.304	1	.012*	0.237
	Attendance			9.768	4	.045*	
	Attendance (1)	0.186	0.778	0.057	1	.811	1.205
	Attendance (2)	-0.066	0.865	0.006	1	.939	0.936
	Attendance (3)	-1.750	0.725	5.828	1	.016*	0.174
	Attendance (4)	-1.595	0.757	4.438	1	.035*	0.203
	Constant	2.537	0.847	8.963	1	.003*	12.645

\**p* < .05

Logistic Regression Analyses Exam	ining the Effect o	of Personal and I	Demographic	Variables on
Score at Five Months Post-Interven	tion (n = 96)			

	Variable	В	SE B	Wald	df	Sig.	Exp(B)
Step 0							
	Constant	042	.204	.042	1	.838	.959

\**p* < .05

#### Chapter V: Discussion

The purpose of this study was to determine the effects of a summer reading intervention on the reading skills of at-risk readers. One hundred and nine students, grades two through seven, from Austin, Minnesota comprised the sample for this empirical study.

The literature review provided a broad foundation upon which to study the efficacy of a reading remediation program for ethnically and economically diverse students. Research indicates students who are English language learners and students from families with low income are at higher risk for reading failure than other same-aged peers. The literature review also provided inconclusive data to support or refute the widely held perception that reading interventions lose their effectiveness after grade three.

In this empirical study, the relationship between grade level and reading skill gains was explored, as well as the existence of variables that may predict positive and/or negative outcomes from the reading intervention. This study addressed three research questions. A restatement of each research question is followed by a discussion of the results for that question.

Research question number one: Did the summer reading intervention significantly increase the reading skills of at-risk readers? When measured two months post-intervention, most students demonstrated nonsignificant increases in reading achievement scaled scores; however students in seventh grade, students who received Title 1 services during the previous year, and Hispanic students demonstrated significant gains. Results also indicated that consistent attendance at the reading intervention produced significant gains in reading achievement.

When measured in January, five months post-intervention, most students demonstrated significant increases in reading achievement scaled scores. Post hoc analyses indicate that second, third, fourth, and seventh grade students who participated in the summer reading

intervention exceeded grade-level expectations (Scantron, 2004) for reading achievement gains. However, at five months post-intervention, these positive effects cannot be directly attributed to the summer intervention. These significant gains in reading achievement may be an interaction of the summer reading intervention and the new, leveled reading curriculum implimented in the fall of 2005. The leveled reading curriculum was not the focus of this study, and its specific contribution to reading achievement gains was not measured or controlled.

Research question number two: Did early elementary students benefit more than middle school students from the summer reading program? Published research is inconclusive regarding the widely held perception that reading interventions lose their effectiveness after grade three. Contrary to this widely held belief, only middle school students displayed significant reading achievement gains two months post-intervention. The two elementary groups displayed significant reading achievement gains five months post-intervention; however, as previously discussed, these positive effects cannot be directly attributed to the summer intervention.

Further investigation is needed to address many unanswered questions (e.g., What was the impact of curricular differrences across the grade levels? What was the impact of the teacher, an unfamiliar peer-group, and/or the student's motivation to avoid summer school next year?). Clarification will benefit the school district and the students.

The ANOVA results indicate statisically significant differences when the reading achievement means are compared across the three grade-level groups. A positive relationship exists between grade-level group and reading achievement. Within this sample of at-risk readers, reading achievement continued to develop across grades two through seven.

Research question number three: What variables best predicted which students benefited from, or did not benefit from, the summer school reading program? To examine this question,

direct logistic regression analyses were used to identify variables that predicted student success, defined as an increase of scaled score gains greater than the mean scaled score gain when comparing the pre-intervention measure with the two post-intervention periods. These logistic regression procedures were implemented using the binary stepwise forward (conditional) approach.

The intervention clearly benefited some students more than others. The logistic regression revealed that summer reading intervention was most beneficial to students for whom attendance was a high priority, as well as students who are Hispanic, and trasitioning from the seventh to the eighth grade.

Why did Hispanic students display stronger reading achievement gains, and more quickly than other ethnic groups? One hypothesis regarding the disproportionate success for Hispanic students rests on the use of interpretors. Interpretors have been used to facilitate parent communications on a regular basis for whom Spanish is their primary language. This bi-weekly communication, implimented at the beginning of the 2005-2006 school year, is typically a novel experience for non-English speaking parents. In addition, culture-based generalizations regarding Hispanic parent's perceptions of the home-school relationship and parent involvement (Tinkler, 2002) lack the emphasis on competition and academic achievement. Perhaps with frequent updates regarding school progress, some Spanish-speaking parents may have taken a greater interest in their student's school performance and provided a form of reinforcement for academic achievement. This form of communication was not available to other non-English speaking parents, and it is not novel for English-speaking parents regardless of ethnicity.

One hypothesis regarding the disproportionate success for seventh grade students rests on the use of remedial curricular materials and programming. The curricular materials may have addressed skill gaps, that when filled, led to incremental reading achievement gains.

One explanation for the absence of predictor variables five months post-intervention is that extraneous (non-study related) variables were introduced that may have diluted, built upon, and/or superceded the effects of grade level, ethnicity, and summer school attendance. As previously discussed, no attempt was made to control for the influence of extraneous variables during each intervention period.

Research indicates students who are English language learners and students from families with low income are at higher risk for reading failure than other same-aged peers. In this empirical study of the efficacy of a reading remediation program, linguistically (n = 32) and economically (n = 41) diverse students were adequately represented. Contrary to expectation, the summer reading intervention did not significantly increase reading achievement for these groups at high-risk for reading failure. Perhaps students in the both the meal assistance and LEP groups failed to benefit from the intervention because their attendance was poor; and, therefore, their exposure to the intervention was limited. As discussed previously, students who attended the summer reading intervention at least twenty-six of the thirty days (at least 87 percent) displayed significant gains in reading achievement at two months post-intervention. The attendance rate of students at risk for reading failure was less than half (meal assistance = 41 percent, LEP = 41 percent) of those students who displayed a significant benefit from the intervention.

This study provided a valuable foundation for further study and analysis. In light of the district's goal, it would appear that one reading intervention is insufficient to meet the district's goal of raising the percentage of students reading at grade level from seventy to eighty-five percent. No local data currently exists to examine multiple exposures to the summer school

reading intervention. However, the prospects for incremental and compounded reading achievement gains toward the eighty-five percent goal hold promise.

#### Limitations

Several limitations are inherent within a study that utilizes existing data for examination. The type and quality of the data may be limited by the following variables: the integrity with which students gave their best effort during the assessment sessions; the integrity with which teachers proctored the assessment sessions; the time of day the assessments were administered; the possibility that additional variables may have been active outside the scope of this study (e.g., tutoring, personal/familial/environmental stressors, physical health, and/or mental health); the impact of inconsistent and/or dissimilar curricular programming on student who have attended two or more school districts; the quality of teaching; the family type (e.g., two biological parents, single parent, blended family); and parental involvement.

The sample size (n = 109) of the current study was too small for the level of detail sought in this study. The reliability of the statistical analyses based on low cell sizes must be suspect. Further, the sample represents the demographic composition in one elementary school and one middle school in one small city in southern Minnesota. Thus, the results of this study should not be generalized to other populations.

The effects on reading achievement gains due to variables such as the specific teacher, the teacher's teaching style, and/or the student's class structure were not evaluated in this study. Examples of other unstudied variables include the following: level of parental support for education; parental years of education; number of previous school attended and/or geographic moves; level of environmental stress; student's motivation; and minutes spent reading outside school between measures of reading achievement.

### **Recommendations**

The following recommendations are directed toward Austin Public Schools. Assuming the summer reading intervention will be offered again, the intervention for students just completing seventh grade should be offered with minimal to no changes. Substantial programmatic changes are needed to increase the short-term effectiveness of the intervention for the majority of students. In general, these results suggest increasing the attendance ratio (days attended/days of intervention) during the summer reading intervention is very likely to produce gains in reading achievement. Findings indicate students in special education would not benefit from a similar reading intervention, and substantial changes would be needed to increase the effectiveness. Finally, expanding this study to include all students who participated in the summer reading intervention (which is now possible since the SCANTRON assessments have been implemented district-wide for grades 2 through 8) and contrasting the data with a matched group of students who did not attend the summer reading intervention are highly recommended.

A study of this nature is a catalyst for future research. Given this is the first summer reading intervention for the Austin schools, future research at the local level will be able to consider intervention effects through the use of cross-sectional and longitudinal data. Through such exploration, the district can examine the effects of the summer reading intervention for students whose participation spanned several consecutive years.

### Conclusion

The purpose of this study was to determine the effects of a summer reading intervention on the reading skills of at-risk readers. The literature identified the variables of LEP and low income as risk factors for reading failure. In addition to LEP and low income (meal assistance), the variables of gender, summer school attendance, ethnicity, grade level, IEP status, and Title 1 status were examined in relation to reading achievement gains on a repeated measure of reading achievement.

At two months post-intervention, widespread non-significant differences were observed. Positive intervention effects were observed for seventh grade students, Hispanic students, and for students who attended the summer reading intervention at least 26 of 30 days. At five months post-intervention, significant gains were maintained in these same student groups.

A discussion of the results suggested several hypotheses in an effort to synthesize and understand the findings. In addition, the limitations of this study and recommendations were discussed.

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