A Case Study of the *Preventing Academic Failure* Orton-Gillingham Approach with Five Students who are Deaf or Hard of Hearing: Using the Mediating Tool of Cued Speech

Jennifer Lynn Montgomery

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ABSTRACT

A CASE STUDY OF THE PREVENTING ACADEMIC FAILURE

ORTON-GILLINGHAM APPROACH

WITH FIVE STUDENTS WHO ARE DEAF OR HARD OF HEARING: USING THE

MEDIATING TOOL OF CUED SPEECH

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Struggling deaf readers, like struggling readers with dyslexia, share similarities in their difficulty with phonemic awareness, decoding, fluency, vocabulary, and comprehension. Orton-Gillingham instruction is used to remediate these difficulties among hearing readers, but data is needed on its effectiveness with deaf students. Five subjects, who were severely deaf or hard of hearing, participated in a year long case study analyzing the impact of an Orton-Gillingham approach, supported with Cued Speech, on the development of their reading skills. Participants ranged from kindergarten to Grade 5, had additional learning, language, and socioeconomic challenges, and were mainstreamed in a public school district. Data were obtained in the fall, winter, and spring of one academic year from assessments (DRA, DIBELS, PAF), interviews with classroom teachers, and field notes. Results demonstrated that all five students made a year of growth, or more, on their reading achievement, similarly to expected yearly progress of students without disabilities. Results indicated that Orton-Gillingham instruction, supported with Cued Speech, may mitigate reading challenges among severely deaf or hard of hearing students in the mainstream. Additional studies are needed to verify the results in different educational settings.

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GLOSSARY OF TERMS

1. **alphabetic principle**: the concept understood by readers that written words and letters correspond to sounds in spoken words (Birsh, 2005)
2. **American Sign Language:** a sign language used throughout North America consisting of visual-gestural parameters, and manual and non-manual grammatical markers
3. **comprehension:** "Making sense of what we read. Comprehension is dependent on good word recognition, fluency, vocabulary, wordly knowledge, and language ability" (Birsh, 2005, p. 563).
4. **criterion-referenced test**: performance assessed based on behavior expected of person taking the test (Birsh, 2005)
5. **Cued Speech:** a system of conveying traditionally spoken languages via eight hand shapes that represent consonants and four hand locations that represent vowels. The system is used in conjunction with the natural mouth movements, or nonmanual signals, from a spoken language. The system has been adapted to over sixty languages.
6. **dyslexia:** "Dyslexia is a specific learning disability that is neurobiological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge" (Lyon, Shaywitz, & Shaywitz, 2003; as cited by Birsh, 2005, p. 566).
7. **fluency**: "in reading, the ability to translate print to speech with rapidity and automaticity that allows the reader to focus on meaning" (Birsh, 2005, p. 567).

8. **Manually Coded English:** a system of borrowing signs from American Sign Language, and putting them in English word order with grammatical markers, to try to convey aspects of English for deaf students. This system does not convey the phonological structure of traditionally spoken languages.
9. **Orton-Gillingham approach**: "Multisensory method of teaching language-related academic skills that focuses on the structure and use of sounds, syllables, words, sentences, and written discourse. Instruction is explicit, systematic, cumulative, direct, and sequential" (Birsh, 2005, p. 573).
10. **phonics**: letter-sound relationships, "an approach to teaching of reading and spelling that emphasizes sound-symbol relationships, especially in early instruction" (Birsh, 2005, p. 574).
11. **phonology:** "the science of speech sounds, including the study of the development of speech sounds in one language or the comparison of speech sound development across different languages" (Birsh, 2005, p. 574).
12. **phonemic awareness**: the ability to manipulate phonemes (individual sounds) in spoken words (Birsh, 2005, p. 574).
13. **phonological awareness**: "Both the knowledge of and sensitivity to the phonological structure of words in a language. Phonological awareness involves a sophisticated ability to notice, think about, or manipulate sound segments in words. It can progress from rhyming; to syllable counting; to detecting first, last, and middle sounds; to segmenting, adding, deleting, and substituting sounds in words" (Birsh, 2005, p. 574).
14. **Visual Phonics:** a system of hand cues that conveys individual phonemes of English

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CHAPTER I.

INTRODUCTION

Statement of the Problem

"All teachers want their students to learn to read, but many simply do not have a source of good, reliable information about effective research-based reading programs…The tide has turned, given the findings of the National Reading Panel and the new Reading First legislation. Schools now have a mandate to provide evidence-based programs for their students. There is no other way." (Shaywitz, 2003, p. 262-263).

Deaf children's literacy continues to be one of the leading issues in the field of deaf education. For decades, the average deaf individual repeatedly scores at a third to fourth grade level on tests of academic and literacy achievement (Conrad, 1979; Allen, 1986; Traxler, 2000). Allen (1994) estimates that only 8% of deaf college students read at an 8th grade level or higher. These results are largely due to several issues endemic to the field of deaf education: 1) Deaf children struggle to gain the spoken language necessary to develop both phonological development for decoding and linguistic knowledge for comprehension (Perfetti & Sandak, 2000; Leybaert & Alegria, 2003; Wang, Trezbek, Luckner, & Paul, 2008) and there is limited use of available methods to address this, such as Cued Speech (Quenin, 1989); 2) There is a belief among some researchers that deaf children can learn to read with a non-phonological approach (Campbell & Wright, 1988; Harris & Beech, 1998; Miller, 2007a); and, 3) there is a limited understanding about how to teach literacy to struggling readers (Moats, 1994; Moats, 1995; Moats & Foorman, 2003).

The National Reading Panel (2000) advises that five areas be targeted during reading instruction: phonemic awareness, alphabetic principle, accuracy and fluency with text,

vocabulary, and comprehension. Problematic for deaf students, the ability to use phonology, while reading, is dependent upon understanding the phonological structure of spoken language (Gombert, 1992). When hearing children come across a word they do not know, they use a grapheme-phoneme assembling process (understanding that the letter 'b' corresponds to the phoneme /b/) to decode a word which then activates the meaning of the word (Transler, Leybaert, & Gombert, 1999). This process is necessary in languages with an alphabetic writing system (Frith, 1985; Stanovich, 1986). With gaps in their oral language, deaf children cannot readily apply these rules, and if they can apply these rules, "that word does not activate anything in their mental lexicon" (Leybaert & Alegria, 2003, p. 268). Among hearing children, phonological tasks, such as phonemic awareness and rhyming, have been shown to have a direct relationship to later reading ability (Bryant, MacLean, & Bradley, 1990; Perfetti & Sandak, 2000; National Reading Panel, 2000; Uhry & Clark, 2004; Catts & Kamhi, 2005).

Without a full model of spoken English, and a diminished access to the phonological code, deaf and hard of hearing children struggle with their ability to decode or 'learn to read', and thus, are then unable to 'read to learn'. This is not to say that all deaf children fail to "crack the code". Conrad (1979), for example, examined the phonological processing skills of oral deaf teenagers in England and Wales. He examined error patterns by comparing short-term memory of printed rhyming words (e.g. *blue, true*) and orthographically similar words (e.g. *farm, lane*). He hypothesized that phonological encoders would have more difficulty recalling the rhyming words while visual encoders would have difficulty with visually similar word pairs. He found that the majority of participants used a phonological code when reading, which strongly correlated to reading comprehension (Conrad, 1979). This seminal work consequently initiated a series of research fundamentally supporting and replicating these findings among students who

were raised orally, with total communication, or with American Sign Language in tasks of readings, spelling, and memory (Hanson, Goodell, & Perfetti, 1991; Hanson, Liberman, & Shankweiler, 1984; Hanson & Wilkenfeld, 1985; Transler, Leybaert, & Gombert, 1999). Despite these findings, the majority of deaf children do not have full access to the phonological code of spoken language, which led Conrad (1979) to suggest that for the vast majority of deaf children a phonological approach to teaching reading was not advisable. Even if deaf and hard of hearing children can decode, they may have limited world knowledge that is necessary for text comprehension and fluency (Leybaert & Alegria, 2003). Children may be identified as deaf, late, missing critical years in the language learning process. Even with amplification, such as hearings aids and cochlear implants, deaf individuals may remain unable to fully access language (Nicholas & Geers, 2003). Parents may be uninformed about alternative methods of communication or may not develop fluency to be adequate models for their children. It is also estimated that at least 40% of deaf children have an additional disability (Mitchell & Karchmer, 2004). Learning and reading disabilities may go unnoticed in the deaf population as academic difficulties are presumed to be caused by the hearing deficit.

Difficulty with phonological awareness and reading ability is prevalent despite various educational methodologies for the deaf. Nicholas and Geers (2003) elaborate that deaf children struggle to acquire spoken language in both oral (OC) and sign communication (SC) environments, which is critical for developing literacy, for a variety of reasons. This diminished access to spoken language "contributes to significant language delays in children with severe and profound hearing loss" (p. 422). Hearing children are exposed to spoken language for five to six years prior to beginning the reading process and many researchers argue that the majority of deaf

children need the same access to spoken language and phonology as hearing children (Perfetti & Sandak, 2000; Wang, et al, 2008).

Advocates of sign language, who often suggest that phonology is unnecessary for literacy (Miller, 2007a), argue that deaf children of deaf parents are able to acquire a language naturally and reach developmental milestones like their hearing peers (Bonvillian, Orlansky, & Novak, 1983; Newport & Meier, 1985; Prinz & Prinz, 1985), but more than 90% of deaf children are born to hearing parents who do not know sign language (Van Cleve, 1987). For those parents who choose a sign communication approach, they may struggle to acquire the linguistic ability necessary to model sign language with fluency in the home, but neither approach gives full access to the spoken language necessary for later literacy acquisition. Nichols and Geers (2003) explain, "neither the SC nor the OC educational approaches have been completely successful in eliminating language delays for severe or profoundly deaf children" (p. 422; see also Geers, Moog, & Schick, 1984). Wandel (1989) studied literacy and language skills, in relation to communication modality, of 90 deaf and hard of hearing students. She found that students from signing programs performed below students from other modalities and far below students who received the most access to English. In a sign communication environment, children struggle to acquire a full linguistic English model because:

a) manual signing systems, such as Signed English, that have been developed to correspond to spoken words do not constitute natural languages themselves, and do not convey the structure of traditionally spoken languages,

b) many of the parents do not develop proficiency with the sign system in the child's early years or do not use it consistently (Moeller & Luetke-Stahlman, 1990), and

c) the same problem of degraded auditory input exists for these children as for children using the OC approach" (Nicholas & Geers, 2003, p. 423).

This reduced access to spoken language, in sign language programs, has a direct impact on literacy ability because deaf children lack the phonological skills to decode the words, and if they can decode them, they do not have the linguistic background in the language to understand what was read.

Children in an oral communication program have difficulty with linguistic information, and subsequent literacy skills because "the speech signal that they rely on for that input is degraded" (p. 422). Dodd (1976) demonstrated that 60% of oral production errors were a direct result from ambiguity in lipreading. Not only is lipreading important for deaf individuals, but hearing individuals are sensitive to it, as well. McGurk and McDonald (1976) showed that lipreading directly influences speech perception for hearing individuals with their McGurk Effect. In a landmark study, when individuals observed a face pronouncing /ga/ with an auditory production of /ba/ they perceived the information as /da/. Numerous other researchers repeated this study and found that perception of spoken language is audiovisual in nature (Burnham, 1998; Summerfield, 1987; Campbell, Dodd, & Burnham, 1998). While hearing aids and cochlear implants have greatly improved access to spoken language, many children "remain unable to extract enough auditory information to develop spoken language with the ease and efficiency of a normally hearing child" (Nicolas & Geers, 2003, p. 422). If the hearing signal is reduced, and lipreading is ambiguous, deaf children need another way to access the spoken language signal.

Despite the published research on literacy levels of deaf children with current sign and oral approaches, at schools for the deaf, English literacy remains largely taught through sight

word reading via a form of sign language or sign-supported speech (Mitchell & Karchmer, 2003; 2004). Historically, after long periods of auditory-oralism in the schools in the 20th century, a paradigm shift occurred due to the lack of progress students were making (Johnson, Liddell, & Erting, 1989). Sign language research (Stokoe, 1960) demonstrated that it was a legitimate language and many educators of the deaf shifted their philosophy from a speech approach to considering sign language to be the natural language of deaf children, and, as a result, used sign language in the classroom as a bridge to English. At many schools for the deaf, children are expected to translate print that represents a sound-based phonological language to which they may have limited access into a visual signed language. American Sign Language is a separate language from English, with its own grammatical structure, lexicon and phonology (Padden & Perlmutter, 1987; Sandler, 1989; Liddell & Johnson, 1989). There is no direct correspondence between the signs of American Sign Language and the spoken or printed form of English. Schools for the deaf try to address this issue by either requiring: 1) total communication, a philosophy that embraces a 'whatever-works' approach in the classroom, but in practice requires teachers to simultaneously talk and sign, which impedes the linguistic signal of both languages, or 2) by having teachers use American Sign Language to model a complete language, which does not address the issue that printed English is a representation of the spoken English language and does not have a phonological, or syntactical correspondence to American Sign Language. Deaf children often approach the reading process without mastery of any language, and specifically, for purposes of this study, reduced access to the phonological components of a spoken language.

While the majority of deaf children struggle to acquire the phonology necessary for literacy acquisition, and many are taught via sign communication methods that do not correspond to spoken English, a minority of deaf students excel with an underutilized system called Cued

Speech (Quenin, 1989). The Cued Speech system (Cornett, 1967) visualizes traditionally spoken languages through a multisensory approach. This multisensory approach includes two parameters, a hand cue presenting consonant phonemes and a location, representing vowel phonemes. The hand cue and hand location, used in conjunction with non-manual signals of mouth movements from the traditionally spoken language, changes the mode by which the phonemes of a language are received. In studies repeated in English, French, and Spanish, deaf and hard of hearing children, who use Cued Speech, were able to acquire comparable English language, phonology, and literacy skills to their hearing peers (Alegria, Charlier, & Mattys, 1999; Colin, Magnan, Ecalle, & Leybaert, 2003; Leybaert & Lechat, 2001; Nicholls & Ling, 1982; Perier, Charlier, Hage, & Alegria, 1988; Wandel, 1989; Torres, Moreno-Torres, & Santana, 2006). In spite of these findings, Quenin (1989) surveyed school programs for the deaf and found only 5% of schools were using the Cued Speech system. The multisensory approach of the cueing system appears to conflict philosophically with other methods. The Cued Speech system is 'too manual for the oralists and too oral for the manualists'. While a method *is* available to provide complete phonological access to traditionally spoken languages, whether or not educators are using it, the question of 'best practice' in curriculum also remains.

Aside from phonological access issues, and methodological arguments that prevent the majority of students from using Cued Speech, many educators lack a foundation in what constitutes good reading instruction and furthermore, many do not know how to teach the structure of spoken and written language (Moats, 2009; Moats & Foorman, 2003). Wilson (1995) asserts, "Teachers have an insufficient grasp of spoken and written language structure (including phonological awareness and morphology) and do not know how to teach reading disabled students" (p. 247). Despite the available research about how hearing children learn to

read (National Reading Panel, 2000) and how deaf students continue to do poorly with methods currently available to them (Wandel, 1989; Nicholas and Geers, 2003), some sign language researchers argue that deaf children can and should learn to read without acquiring English phonology, via a system or language that does not correspond to English (Campbell & Wright, 1988; Chamberlain & Mayberry, 2000; Harris & Beech, 1998; Miller, 2007a; Padden & Ramsey, 2000; Wilbur, 2000), and without discussion of any corresponding curriculum that is well-tested or commonly used with hearing children. One Title I study demonstrated, however, that when effective reading curriculum is used, rates of reading difficulties among hearing children are reduced to six percent (Foorman, et al, 1998). Other studies found appropriate reading instruction reduced difficulties to below two percent (Foorman, 2003; Torgesen, 2002; 2004). If these results are possible among hearing children, with the addition of Cued Speech, and an evidence-based reading program, the same results could be achieved among deaf students.

At the present time, educators of the deaf are not using evidence-based reading programs. Based on a review of academic databases, no studies exist demonstrating outcomes with a phonologically based, Orton-Gillingham approach with deaf children, which is the leading method of instruction for struggling hearing readers with disabilities (Catts & Kamhi, 2005; Shaywitz, 2003). This may be due to several reasons: 1) there is a discrepancy between the literature on how hearing children learn to read and how deaf education researchers would like to teach reading, 2) there is a lack of information or understanding about the Orton-Gillingham approach and literacy instruction; and 3) there is a lack of information or understanding about conveying a spoken phonology in a visual manner.

Purpose of the Study

As a result, this study is meant to address these issues and to fill the void as to the applicability of a structured phonologically based Orton-Gillingham approach to develop bottom-up and top-down reading skills, in conjunction with a visually based phonological system, such as Cued Speech. If the results demonstrate that this direct instructional method supports an increase in the five recommended areas of the National Reading Panel (2000) with these students, other educators may consider using this program, in conjunction with a visual phonological system such as Cued Speech, in their classrooms.

Research Questions

1. In one school year, will deaf and hard of hearing students demonstrate growth in phonemic awareness with an Orton-Gillingham approach?
2. In one school year, will deaf and hard of hearing students demonstrate growth in the alphabetic principle with an Orton-Gillingham approach?
3. In one school year, will deaf and hard of hearing students demonstrate growth in text accuracy and fluency with an Orton-Gillingham approach?
4. In one school year, will deaf and hard of hearing students demonstrate growth in reading comprehension with an Orton-Gillingham approach?
5. In one school year, will deaf and hard of hearing students demonstrate growth in vocabulary development with an Orton-Gillingham approach?

CHAPTER II.

REVIEW OF THE LITERATURE

Literacy

In 1997, Congress asked the National Institute of Child Health and Human Development to create a national panel on the effectiveness of various reading approaches. The committee based some of their work on the National Research Council (NRC) Committee on Preventing Reading Difficulties in Young Children (Snow, Burns, & Griffin, 1998). Based on their meta-analysis of reading research, the National Reading Panel (2000) describes five areas that are critical to reading achievement. They are phonemic awareness, the alphabetic principle, accuracy and fluency with text, vocabulary, and comprehension. A good reading program should incorporate these five areas in order to expect student success.

Phonemic Awareness. The National Reading Panel (2000) defines phonemic awareness (PA) as the ability to manipulate phonemes, the smallest units in spoken language, in spoken syllables and words. PA instruction is often confused with phonics instruction and the NRP clarifies the difference by noting that phonics instruction is the manipulation of letter-sound relationships in print. PA instruction is also differentiated from auditory discrimination which is the ability to recognize whether words are the same or different. Based on 52 evidence-based quantitative studies, the panel found that instruction in phonemic awareness was highly effective across teaching conditions, a variety of learners, and a variety of grades. PA instruction significantly improved both reading achievement and spelling more than any other instruction that lacked PA training. The effects of PA instruction lasted well-beyond the training. PA instruction and letter knowledge were the two best predictors of reading capability during the first two years of reading instruction, although the National Reading Panel did not define their

measures or what they defined as reading capability or achievement. Most effective in PA instruction were explicit and systematic instruction of phoneme manipulation, focused instruction on one or two types of phonemes, and small-group instruction. The NRP (2000) clarifies that PA training was not effective at alleviating spelling difficulties among readers with disabilities and that it is only one part of a total reading program.

Alphabetic Principle. Phonics instruction is the acquisition of letter-sound relationships in reading and spelling. While there is not a one-to-one correspondence between all letters and sounds in English, (e.g. caught has six letters and three sounds), 84% of phonics is predictable (Moats, 2006). The purpose of phonics instruction for beginning readers is to understand how sounds, or phonemes, of the spoken language are connected to graphemes, the printed letters. Stanovich (1993, 1994) explains that, "direct instruction in alphabetic coding facilitates early reading acquisition is one of the most well-established conclusions in all of behavioral sciences," (p. 286).

The NRP (2000) discuss that phonics instruction is either systematic (a program of sequential elements) or incidental (highlighted when they appear in a text) in research studies. A systematic approach to phonics instruction had a significant and positive effect on reading and spelling among readers with disabilities. Students improved in their ability to read words and comprehend text. There is a significant impact for improving alphabetic knowledge and word reading skills among students from low socioeconomic backgrounds. There was a large impact for students in kindergarten and first grade and the NRP suggests the alphabetic principle be taught at these grade levels. Some areas of concern were related to the intensity of a systematic program. The authors are unclear on the level of intensity necessary for an ideal phonics program. Another issue mentioned is that in phonics programs with a large effect size, teachers

follow a standard protocol and the authors discuss concerns regarding a lack of teacher creativity and possible reduced motivation. They also suggest that, based on their findings, schools may place heavy emphasis on phonics instruction and should be careful to maintain creativity and enthusiasm for fluency, text reading, and comprehension.

Accuracy and Fluency with Text. The National Reading Panel (2000) describes fluency as the ability to read orally with speech, accuracy, and expression. Fluency is necessary for reading comprehension, but is often not a part of classroom reading instruction. Guided oral reading and independent silent reading are the methods often used for fluency instruction. Guided reading had a significant and positive effect on word recognition, fluency, and comprehension across all grades and student ability levels.

Research was unclear, however, as to whether independent reading improved fluency. The authors explain, "Literally hundreds of correlational studies find that the best readers read the most and the poor readers read the least. These correlational studies suggest that the more that children read, the better their fluency, vocabulary, and comprehension" (NRP, 2000, p. 12). The authors claim, however, that independent reading should not be the only type of reading instruction, especially for students who do not have alphabetic and word reading skills. Most independent reading research was causational and a meta-analysis could not be performed. Data was not sufficient to draw conclusions on independent reading and its relation to fluency.

Vocabulary. Vocabulary plays a central role in reading development because "the larger the reader's vocabulary (either oral or print), the easier it is to make sense of the text (National Reading Panel, 2000, p. 13). If a reader comes across an unknown word in a text, but can decode the word, they may be able to use contextual information to identify the meaning of the word. The more vocabulary an individual has, the more meaning they will derive from reading. Out of

20,000 studies related to direct instruction of vocabulary development and reading, the NRP reviewed fifty studies that met their criteria for evidence based practice with twenty-one different methods for teaching vocabulary. The meta-analysis revealed that instruction in vocabulary improves reading comprehension, but multiple methods can and should be used. The authors suggest repetition, direct and incidental learning, computer programs, and substituting easier words for more challenging words to improve vocabulary acquisition, and subsequently text comprehension.

Comprehension. The National Reading Panel describes comprehension as the "essence of reading…essential not only to academic learning in all subject areas but to lifelong learning" (p. 13). The panel explains that comprehension is intertwined with knowledge of vocabulary, a meaningful interaction with the text, and a teacher's ability to teach reading comprehension strategies. "The larger the reader's vocabulary (either oral or print), the easier it is to make sense of the text" (p. 13). Various approaches to teaching vocabulary were effective in the literature, including computer-based programs, repeated exposure, reviewing words before reading, and substituting easy words for more difficult words. Explicit instruction in comprehension strategies should be demonstrated until students "are able to carry them out independently" (p. 14). Effective comprehension strategies include comprehension monitoring, cooperative learning, graphic organizers, answering questions about the text, generating questions, examining story structure, and summarizing.

Literacy and Dyslexia

Dyslexia is a learning disability under Public Law 94-142. In a definition agreed upon by the International Dyslexia Association (IDA) and the National Institute of Child Health and Human Development (NICHD):

> Dyslexia is a specific learning disability that is neurobiological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge (Lyon, Shaywitz, and Shaywitz, 2003, p.1).

For thirty years, dyslexia has been considered a language-based disability (Stanovich, 1986, Shaywitz, 2003; Catts & Kamhi, 2005). Dyslexia specifically impacts the phonological components of language and thus, individuals are unable to "construct complete inner models of the sound structure of words" (Uhry & Clark, 2004, p. 34).

Individuals with dyslexia substitute words that sound alike, confuse sounds in long words, and have difficulty with speech perception when in the presence of background noise. Uhry and Clark (2004) explain that, "the verbal world of individuals with dyslexia is overwhelmingly full of phonological confusion" (p. 34). Stanovich (1986) describes that underlying phonological deficits impact comprehension, vocabulary development, and IQ through lack of print experiences (Stanovich, 1986; Uhry & Clark, 2004). According to Stanovich (1986), a *Matthew Effect* occurs, a term coined from a biblical verse whereby "the rich get richer and the poor get poorer," because individuals with dyslexia, unable to decode text, cannot gain new information from literature and this impacts their overall world knowledge. This difficulty with phonological awareness and subsequent struggle to develop literacy also impacts spelling, writing, word knowledge, and as a result of poor reading abilities, graduation

rates, and the ability to hold a job (Uhry & Clark; 2004). Fortunately, for individuals with dyslexia, "special instruction has been developed to minimize these negative outcomes" (Uhry & Clark, 2004, p. 23).

Orton-Gillingham Approach. An Orton-Gillingham approach is a systematic, sequential, multisensory method to reading, writing, and spelling instruction, typically used with students who have reading or learning disabilities. Post (2003) asserts, "code instruction based on Orton-Gillingham is the oldest and best established literacy method in the United States and has received the most attention over the years" (p. 130). An Orton-Gillingham approach involves visual, auditory, and kinesthetic learning, also referred to as the *Language Triangle (*Clark & Uhry, 1995*)*. Multisensory methods date back to educator Grace Fernald in the 1920s. Fernald had students trace letters while saying their names aloud to help develop "memory schema for the stimulus information" (p. 92). She referred to her procedure as the visual, auditory, kinesthetic, and tactile (VAKT) approach. Credit for multisensory instruction, however, is most closely associated with the child neurologist Dr. Samuel Orton.

In the early 20th century, Dr. Samuel Orton (1879-1948) was a child neurologist with an interest in people unable to read, but with typical intelligence. Agreeing with predominant theories of that time (Hinshelwood, e.g. 1896, 1917; as cited by Post, 2003) he first believed that reading disabilities were related to visual perception difficulties with the printed symbols, also known as "word blindness". Later, his views changed and he thought the issue was related to right hemispheric dominance that could be addressed "through adequate training by way of intact faculties located in the left hemisphere" (Post, 2003. p. 129). Orton was one of the first to acknowledge the role of spoken language in literacy acquisition. According to Post (2003), Orton described "the intimate relation of reading, writing, spelling, and speaking, and how they

shape what he called 'the language faculty'" (p. 129). While he never referred to phonological awareness, he observed that "his patients lacked an understanding of the role sounds play in written words" (p. 129). Aware of allophony, or sound variations, he was the first to suggest teaching the "differentiation of the varying sounds," so that a word known by ear will be recognized when read (Orton, 1937, p. 162). Orton considered the development of written literacy similar to a "secondary language," due to the difficulties of individuals transitioning from speech to the printed representation. Post (2003) clarifies that "the bond between graphic and spoken word is, therefore, never released, although their relation changes in the course of literacy acquisition. The written word functions as a secondary language for skilled and unskilled user alike." (p. 128).

To address the issue of connecting spoken language with the printed symbol, Dr. Orton developed an instructional procedure to teach reading that integrated multiple senses, motor patterns, and a "simultaneous linking of auditory, visual, and kinesthetic/tactile pathways" (p. 129). His methods were published in 1960 by his colleague, Anna Gillingham. As described by Rose and Zirkel (2007), Gillingham modified Orton's approach and created a slightly different method. In Orton's approach, students pronounced the sounds of the letters, while spelling them, while Gillingham had students say the letter names. There were other differences in the teaching of the schwa, final *y* pronunciation, and cursive instruction, but the basic underlying approach remained the same and has since been adapted and modified to at least fifteen other programs. Today, the programs that are based on Orton and Gillingham's original methods fall under the professional jargon of Orton-Gillingham methods. Furthermore, phonological and language processing difficulties are believed to be the primary cause of dyslexia and reading disabilities, not visual or hemispheric dominance issues, but Dr. Orton's educational methodology remains.

In an Orton-Gillingham approach, (Ritchey & Goeke, 2006), "explicit instruction is provided in phonology, phonological awareness, sound-symbol correspondence, syllables, morphology, syntax, and semantics" (p. 172). In other words, bottom-up reading processes are explicitly taught in a particular progression. Contemporary O-G instruction is provided by trained individuals who directly and systematically teach the rules of language in a hierarchy and that students master a skill before going onto a new skill (Clark & Uhry, 1995). Students are first taught phonemic awareness, then they learn to manipulate individual phonemes in words, next they learn words with consonant blends, then six syllable types, then sounds with multiple spellings, then morphology (2005). The authors explain that automaticity in a skill level, such as mastering letter-sound relationships before consonant blends, must be practiced before moving to a higher skill. Other principles of an Orton-Gillingham approach include frequent feedback, pacing, and learning to mastery (Uhry & Clark, 2004). Instruction includes both synthetic (letters/sounds to form words) and analytic (breaking words apart) approaches. Ongoing assessment individualizes learning for each student. This approach remains the commonly accepted and widespread methodology recommended for individuals with reading disabilities.

Throughout this acquisition of the structure of language, vocabulary and text comprehension are also directly taught in contemporary programs. In the Orton-Gillingham textbook, *Multisensory Teaching of Basic Language Skills* (Birsh, 2005) the author suggests limiting the number of new words learned at a time, to select high frequency words, use visual aids, and to minimize linguistic demands. In the PAF Orton-Gillingham curriculum, for example, language rules are taught in a hierarchy, in addition to vocabulary. Students practice reading strategies through word lists, corresponding work books with graphic organizers and

pictures, basal readers, and through direct instruction from the teacher. Ongoing assessment checks for fluency with text, prior knowledge, vocabulary, and student understanding of what is being read through retelling and answering questions.

The original Orton and Gillingham approach is still used today in varying adaptations, such as Alphabetic Phonics (Cox, 1985), Wilson Reading System (Wilson, 1996), The Spalding Method (Spalding & Spalding, 1990), and Preventing Academic Failure (Bertin & Perlman, 1998). These approaches all target orthography, phonology, syntax, fluency, comprehension, and vocabulary with differences primarily in the order of literacy skills taught and methods of multisensory instruction.

Efficacy of the Orton-Gillingham Approach. Is an Orton-Gillingham approach evidence-based practice? The National Reading Panel (2000), National Research Council, and National Institute for Health recommend the underlying components, such as phonological awareness and phonics, inherent in O-G instruction. Not all O-G curriculums have a fluency or comprehension component and while Orton and Gillingham originally advised against supplementing their approach, some current O-G programs, such as Preventing Academic Failure (PAF), supplement with fluency and comprehension materials.

Ritchey and Goeke (2006) included 12 studies, from 1980-2005, in a review of Orton-Gillingham instruction. Studies were included if they were published in a scholarly journal, studied multisensory instruction using an O-G approach, were experimental or quasi-experimental, and had a sample of at least 10 participants per condition. Of the 12 studies, five found that an O-G approach was more effective than a comparison approach for all measured reading outcomes. Another four studies found that O-G instruction was more effective for some, but not all, of the measured outcomes. Seven of the studies had a large effect for word attack,

non-word reading, and comprehension and a small to medium effect, over the control groups, for real word reading. The authors discuss, however, several limitations regarding evidence for Orton-Gillingham methods. At the time of the review (2006), there were few O-G studies with experimental or quasi-experimental designs. There were methodological issues because studies completed in the 1970s and 1980s were not held to the same accountability standards as studies done today. Internal validity was difficult to determine because some of the studies did not report information on equivalency of treatment groups in the quasi-experimental designs. Most of the studies were published in the journal *Annals of Dyslexia*, which is published by the Orton Dyslexia Society. Thus, authors could have research bias in their conclusions.

Joshi, Dahlgren, and Boulware-Gooden (2002) conducted a study meeting evidence-based practice standards of students at the first grade level. The study took place in a southwest inner-city school district of 40,000 students. Two classrooms received multisensory instruction with an Orton-Gillingham program based on Alphabetic Phonics (Cox, 1985) called Language Basics: Elementary. Two control classrooms received instruction with Houghton-Mifflin Basal Reading Program. Students were matched for socioeconomic status and race, and no students had vision, hearing, or cognitive difficulties. Pre-test data were taken in September with a battery of instruments, including Test of Phonological Awareness (TOPA), Word Attack subtest of Woodcock Reading Mastery Test-Revised (WRWT-R), and the comprehension section of Gates-MacGinitie Reading Test (GMRT). Tests were administered one day apart. Instruction in the control group was intended to be 'balanced literacy' with emphasis on both decoding and comprehension, but based on weekly researcher observations, instruction was primarily practice with the basal readers. The treatment group received instruction from licensed Orton-Gillingham instructors with a certification in "Academic Language Therapist." They received 42 hours of

training and participated in clinical supervision. All four classrooms received 50 minutes of daily literacy instruction from teachers with at least ten years of experience. In May, the same tests were administered. Findings indicated that students taught with the OG approach "performed better on tests of phonological awareness, decoding, and reading comprehension than the control groups" (p. 237). The authors suggest additional research is needed in the approach across grade levels and that more teachers need training in multisensory methods.

The What Works Clearinghouse (WWC) reviewed nine Wilson Reading studies. One study (Torgeson, et al, 2006), consisting of 70 students, met their evidence-based guidelines. The study found positive effects for alphabetic, fluency, and comprehension, but the WWC cites only small evidence for the Wilson curriculum due to only one study meeting their guidelines.

Wilson and O'Connor (1995) assessed 220 students with language based learning disabilities in their growth in reading and spelling. Students received an O-G approach using the Wilson Reading System, a widely-used classroom pull-out approach to remediate students with reading difficulties. Special education students in third grade through twelfth grade participated in the study from schools in Massachusetts, Maine, and New Jersey. Selected students had previously received one-on-one instruction in another approach, but had not shown progress. Pre-test and post-test information was obtained using the Woodcock Reading Mastery Test to assess changes in word attack skills, word identification, word comprehension, and passage comprehension. A Wilson curriculum test assessed spelling achievement. Teachers received two days of training, five observations from a supervisor, and monthly seminars. Post-test data revealed significant gains in word attack (average increase of 4.6 grade levels), reading comprehension (average increase of 1.6 grade levels), total reading (average increase of 1.9

grade levels), and spelling. The results demonstrated that the Wilson program was more effective than previous non-multisensory reading interventions.

More experimental studies are needed in the field due to the widespread use of O-G instructional practices throughout public education. There is a "disparity between research and practice." There is often a divide between what educational researchers know about education and what is happening in the field, but in the case of Orton-Gillingham, the methodology is commonly used, and yet there is mixed and inadequate evidence and a "practice to research" phenomenon exists (Ritchey & Goeke, 2006). While teachers and parents find O-G methods effective, more literature is needed comparing different O-G methodologies, conditions for greatest success, and for which students an O-G methodology is most effective.

Similarities between Dyslexia and Hearing Loss. Interestingly, deaf children share similarities with hearing children who have reading disabilities. When comparing the literature across both areas, many of these difficulties are also found in the deaf population. Both groups are more likely to use visual-orthographic strategies among the poorer readers. The *Matthew Effect* impacts both deaf children and children with dyslexia as both groups struggle with reading comprehension because of the difficulty of practicing fluency and acquiring world knowledge, without the ability to decode (Stanovich, 1986). Similarly to children with dyslexia, deaf children struggle with phonemic awareness, and verbal short term memory because of the relationship to phonetic recoding. In comparison to a hearing loss, dyslexia is recognized as a language-based problem that impacts oral language, speech perception, and the ability to listen and talk. Individuals with dyslexia struggle to "construct complete inner models of the sound structure of words" (Uhry and Clark, 2004). While the etiology of both disabilities may be

different, the impact of both disabilities is similar. This leads to the question of whether deaf education researchers can borrow from the field of reading and dyslexia.

Interestingly, there is little information available either comparing the difficulties experienced by both deaf and dyslexic readers or borrowing from the field of dyslexia and applying it to the deaf population. Several studies analyze direct instruction curriculum, with deaf students (Narr, 2008; Trezek, Wang, Woods, Gampp, & Paul, 2007; Trezek & Malmgren, 2005; Trezek & Wank, 2006), but no studies could be found in the literature that specifically use a reading curriculum for students with dyslexia with deaf children.

Two previous articles (Miller, 2005; Enns & Lafond, 2007) discuss the similarities between students who are deaf and students with dyslexia, and implications for these groups. Neither of these studies used an Orton-Gillingham approach to literacy instruction. Enns and Lafond (2007) suggests that most deaf children could be classified as dyslexic given the broader definition of difficulties with "word identification and reading comprehension, with associated difficulties with spelling, writing, and spoken language…[in spite of] normal intelligence and adequate social, emotional, and intellectual capacity" (p. 64) The authors monitored two students who were classified as both deaf and dyslexic in their regular academic program. They videotaped three sessions out of a ten-session cycle and conducted a pre-assessment in October and post-assessment in May using a Reading Aptitude Survey, sight word reading test, and the Test of Early Reading Ability-Deaf/Hard of Hearing version. The instructional method was monitoring the reading of word lists or passages in sign language, but when reading in passages, students paraphrased and translated the text conceptually into sign. The authors did not describe the method of reading instruction employed in the classroom and attributed progress to natural

development over a 6-month period. The study did not discuss recommended methodology from the National Reading Panel.

In the other study comparing deaf and dyslexic students, Miller (2007) acknowledges a parallel between deaf and dyslexic readers. Miller (2007) compared twenty-three students with dyslexia to 20 students with prelingual deafness, who used a total communication approach with signed and spoken Hebrew in school and spoken language in the home, and had a control group of 41 typically developing hearing students. Miller looked at four areas: execution of motor actions, the judgment of two digit stimuli, perceptual processing of word pairs, and conceptual processing of word pairs. Miller concluded that reading difficulties of both the dyslexic and deaf readers were from different sources, neither which were related to phonological processing. Miller is a non-phonologist (Allen, et al, 2009) and advocates visual methodologies, such as sign language, in teaching literacy development. He proposes radically different viewpoints from common viewpoints of literacy and phonological development. Miller disagrees with the findings of the National Reading Panel and concludes that researchers who self-reportedly found evidence of phonology in their studies, did not actually find evidence of phonology (Allen, et al, 2009).

Literacy Development in Deaf Children

Phonological Awareness and the Alphabetic Principle. Numerous studies suggest (Conrad, 1979; Alegria, 1998; Hanson, 1991; Marshark & Harris, 1996; Perfetti and Sandak, 2000; Transler, Leybaert, and Gombert, 1999) and research by the National Reading Panel (2000), confirms, that phonological awareness is a critical component to literacy acquisition. Deaf individuals are at a disadvantage in that they may have limited access to spoken language, and thus, phonological processing, to become competent readers. Several studies (Conrad, 1979; Allen, 1986; Traxler, 2000) show that despite decades of work in the area of literacy and

deafness, average reading levels have not changed among the deaf population in the past several decades.

While phonological awareness is a recognized component to the literacy process in hearing children, researchers in the field of deaf education have argued whether this is a necessary component for literacy among deaf children. Two perspectives have emerged and the literature is divided among those who believe reading difficulties among deaf individuals are due to a deficit in phonological processing, and can only be alleviated through better access to phonemic awareness (Perfetti and Sandak, 2000; Paul, Wang, Trezek, Luckner; 2009) and others who argue whether poor reading levels can be attributed to deficits in access to *any* language, such as American Sign Language (Allen, Clark, del Giudice, Koo, Lieberman, Mayberry, and Miller, 2009; Marschark, et al, 2009; Musselman, 2000; Paul, 2003). These analytic arguments have a profound impact in the field as the majority of schools for the deaf continue to teach reading through sign language, which not only is a different language from spoken English, but is not based on English phonology. Some deaf educators have attempted to create an English based sign language, such as Signing Exact English (SEE) or Manually Coded English (MCE) where signs are used in English word order and English grammatical concepts, such as –ing, are added onto signs. While this approach may provide additional information about the English language, the system does not address that English is a consonant-vowel language based on spoken phonology. Manually coded English signing systems do not convey English at the phonological level with one-to-one correspondence to the phoneme stream of traditionally spoken languages (Musselman, 2000). Reading levels have not changed among students using signed English approaches (Johnson, Liddell, & Erting, 1989). Given the requirement that schools use evidence-based instruction (No Child Left Behind [NCLB], 2003), if the research

demonstrates that deaf children learn to read through phonological processing, schools for the deaf may choose to reevaluate their methodology, and adopt an explicit phonemically-based reading program.

Phonology Theorists. For those who argue that phonology is a necessary component to anyone learning to read, there is substantial literature to support this claim (Conrad, 1979; Marschark & Harris, 1996; Perfetti and Sandak, 2000). In a review by Perfetti and Sandak (2000), they assert that, "reading is a process dependent on the language that provides the basis of that writing system." Wang, et al (2008) asserts that whether one is deaf, has a reading disability, or is learning English as a second language, "that there are certain fundamental skills that are critical for the acquisition of reading in English" (p. 397). In an often cited literature review by Hanson (1989), she found that phonological coding was present in better deaf readers and that the most skilled readers had a sensitivity to phonology. According to Hanson (1989), deaf readers acquired phonology from speaking, lip-reading, and orthography from text.

A seminal study by Conrad (1979), on phonological coding, examined an internal speech ratio (ISR), or phonological processing, among deaf readers between the ages of 15 and 16 in England and Wales. He administered orthographically similar words, and phonologically similar words, and analyzed the errors patterns in the responses. Conrad found that one's degree of deafness and intelligence was not as important in phonological awareness as the use of internal speech.

Colin, Magnan, Ecalle, & Leybaert (2007) compared 21 deaf pre-readers and 21 hearing peers, over the course of a year, on their ability to make decisions about rhyming words and generate rhyming words. In the first task, children had to select the correct rhyming word that matched a model. In the second task, children were shown four pictures that ended with the

same phoneme and they had to name as many words as possible that rhymed with the examples. The subjects were reassessed a year later and given an additional print assessment where they had to identify the correct rhyming word out of five possible choices, with distractors, such as orthographically correct words, pseudowords, and visually similar words. The authors found evidence of phonological skills in both the hearing and deaf readers. Interestingly, phonological skills in the pre-readers predicted their ability a year later on the written component of the post-test, following a year of reading instruction.

In another study (Transler, Leybaert, & Gombert, 1999), authors asked whether French deaf children used phonological syllables as reading units. The hearing and deaf study participants had to do a copy paradigm of words and pseudowords because it was a task typically expected by students in school. The authors elaborate that while the rhyme is critical in literacy for English speaking children, the syllable is critical while reading in French. Results demonstrated that deaf children do use phonological syllables like their hearing peers, but they have to expend more cognitive effort than hearing children when the phonology and orthography of the words are different. The authors suggest that this is because it is harder to decode words that are orthographically different from their pronunciation.

Non-Phonology Theorists. In Wang, et al. (2008), authors cite Hanson's article entitled, "Is reading different for deaf individuals?" (1989, p. 85). Wang (2008) describes that some educational theorists believe that reading is a different experience for deaf individuals (Miller, 2007a; Paul, 2003). These theorists believe that deaf individuals think differently, are visual learners and, thus, providing instruction in phonemic awareness is "meaningless and inappropriate" (Wang, et al, 2008, p. 397). These researchers sometimes refer to non-Western languages, such as Chinese, as an example of readers being able to acquire literacy skills through

non-phonological means, but a review of research found that contrary to this belief, a *universal phonological principle* is found throughout reading systems, including character-based written languages (Leong, Nitta, Yamada, 2003; Perfetti, 2003). This "non-phonological" group of theorists believes that deaf students can learn American Sign Language as a first language and English via print literacy as a second language (Chamberlain & Mayberry, 2000; Padden & Ramsey, 2000; Wilbur, 2000). Most of the data in this area is theoretical. There is limited published evidence of reading achievement and English-ASL bilingual schools, as described above. However, descriptive evidence is reported by Kyllo (2010) in a public school district in Minnesota, but English is supplemented with Cued Speech and, thus, does not support the non-phonology theorists.

In a review of bilingual-bicultural education and literacy, Mayer and Akamatsu (2003) explain that some theorists believe that through American Sign Language, "students will not only have greater and easier access to curricular content but will also develop higher levels of literacy, even without exposure to the language in its primary form through speech or alternatively through signed forms of that language" (p. 136). The basis for this idea dates back to Cummins (1979) *linguistic interdependence principle*. This principle rationalizes that proficiency in a first language transfers to ability in a second language. Cummins assumed, however, that the language user would have: 1) opportunities to use both the spoken and written form of both languages and; 2) would develop proficiency in both the spoken and written form of the first language; and 3) would then use this proficiency to develop both the spoken and written form of the second language (Mayer & Akamatsu, 2003).

While there is little published research on literacy levels with this English via print method, reports that deaf children of deaf parents who use ASL in the home have higher reading

levels on average than deaf children of hearing parents is often cited as a support for ASL as the L1 and English via print as the L2 (Newport & Meier, 1985). What the non-phonologists are unable to prove is that these reading abilities are due to other strategies than phonological encoding. Research focused on deaf students, who are raised with ASL as their L1, even those with poor speech, found they use phonological encoding while reading (Hanson, Goodell, & Perfetti, 1991).

Accuracy and Fluency with Text and Comprehension. Several researchers have discussed the challenges of reading comprehension for deaf students (Chamberlain & Mayberry, 2000; Kelly, et al, 2001; Marschark, et al, 2009). Kelly et al. (2001) explain that as more deaf students attend college, understanding instructional methods for deaf students is necessary in order to help them read college level texts. As discussed, students need adequate knowledge of both the phonological structure of language and the target language itself, in order to read (Musselman, 2000; Perfetti & Sandak, 2000). Kelly et al. (2001) explains that metacognition is also important during reading comprehension. Metacognition is "knowledge one has about how one learns" (p. 386). In order to demonstrate comprehension, individuals must be able to use metacognitive strategies in their learning. Comprehension monitoring, a metacognitive strategy and an essential component of reading comprehension as described by the National Reading Panel (2000) is difficult for deaf students (Kelly, et al, 2001) . Marshark et al. (2009) describes that deaf students have a lack of knowledge about content due to lack of early and full exposure to language. This causes a 'double burden' for deaf students because they are "unskilled and unaware" (p. 366) of how much information they are missing. Studies by Kelly et al. (2001) and Marshark et al. (2009) examined this problematic issue for deaf readers attempting to comprehend text.

Kelly and colleagues (2001) conducted two studies using an error detection paradigm with 46 deaf college students to assess reading comprehension. In the first study, students had to state the main idea of a reading passage from a college science textbook. They had to answer content questions to show their understanding of words and phrases and also recognize an incongruent sentence in the passage. Results demonstrated that the deaf college students were unable to state the main idea or identify the incongruent sentences. In a follow-up study, the effect of strategy instruction was analyzed to see if direct instruction in the target skills would change whether students could identify the main idea and incongruent sentences to demonstrate improved comprehension. Results again indicated that the college students were still unable to identify the main idea, even after direct instruction in how to do so. Students averaged less than 50% for passage comprehension. Kelly and colleagues (2001) surmised that these results were due to the inability of deaf participants to use comprehension monitoring and metacognition during reading. This study had no control group so a similar study was designed by Marschark et al. (2009) to assess whether the challenges experienced by the college students was due to a reading comprehension issue or due to some other problem.

Marshark et al. (2009) conducted two experiments involving information from a science textbook. The authors wanted to know if problems demonstrated in the study by Kelly and colleagues (2001) were due to vocabulary, grammar, and metacognitive difficulties, or whether they were due to issues with language in general. This study had 20 deaf subjects and a control group of 20 hearing students. The students analyzed passages both by reading the passages and also by attending to passages signed by an American Sign Language user on a video. The hearing control group read passages and then attended to passages that were read out loud on a video. These results confirmed the previous study. The deaf students again performed below

50% or more in passage comprehension. Interestingly, the hearing subjects also did poorly on this test and the authors suggest that the selected passages may have been too challenging or their idea of the main idea differed from that of the student participants. The authors followed-up with a second experiment in which half the subjects had to retell as much of the passage that they could recall, either in sign or orally for the hearing subjects, and the other half had to write down as much of the passage as they could recall. Results demonstrated that the deaf students viewed the passage "as a collection of individual ideas, rather than potentially as more than the sum of its parts" (p. 365). The authors analyzed their findings by concluding that deaf college students do not learn more from sign language than they do from print. They elaborate, "deaf college students reported recognizing that they never fully understood interpreted classroom lectures, missing up to 50%, but also indicating that they did not expect to do so" (p. 366). The authors explain that their results contribute to understanding why reading difficulties of deaf individuals have not improved, on average, over 100 years (Marshark, e t al, 2009). These studies suggest that without access to a complete language, reading skills such as inferencing and comprehension monitoring are just as impacted as beginning skills such as decoding. Interestingly, while the average deaf reader is impacted in bottom-up and top-down reading processes, the minority of deaf students who use Cued Speech, produce entirely different results (Alegria, Charlier, & Mattys, 1999; Colin, Magnan, Ecalle, & Leybaert, 2003; Leybaert & Lechat, 2001; Nicholls & Ling, 1982; Perier, Charlier, Hage, & Alegria, 1988; Wandel, 1989; Torres, Moreno-Torres, & Santana, 2006).

Cued Speech

Cued Speech (CS) was developed by Orin Cornett in 1966 to address the impoverished literacy levels pervasive among deaf individuals (Shull & Crain, 2010). Cornett believed, "that

clear, complete access to phonology is a prerequisite to develop proficiency with the written form" (Shull & Crain, 2010, p. 27). The system has since been adapted to more than 60 languages and dialects (Shull & Crain, 2010). "CS is neither a sign language nor a manually coded system…Instead; it is a mode of communication for visually conveying traditionally spoken languages at the phonemic level (i.e. the same linguistic level conveyed via speech to hearing individuals" (Hage & Leybaert, 2006).

LaSasso (2010) describes that, historically, deaf children have been viewed as disabled and in need of various support services, largely due to fifty years of unchanging reading comprehension scores with deaf students graduating at the level of a 9-year-old hearing student (Karchmer & Mitchell, 2003). She explains that some researchers (Johnson, Liddell, & Erting, 1989) believe deaf children are unable to acquire English because it is "neither a visual language nor a natural language for deaf children and that only signed, or sign, languages are natural languages for deaf children" (Lasasso, 2010, p. 3). Research in the area of Cued Speech, however, views deaf children as "capable of learning English naturally in the same ways and at the rates as hearing peers" (p. 3). Lasasso proposes that Cued Speech allows for a paradigm shift from viewing deaf children in terms of disability to viewing deaf children as "1) capable visual learners, 2) capable of acquiring English (and other traditionally spoken languages…and 3) capable of learning to read and progress through the curriculum in the same way and at the same rates as hearing peers" (p. 4). LaSasso (2010) cites urgency of Cued Speech implementation based on school accountability to develop phonology and reading ability among all students based on No Child Left Behind and Reading First Initiatives (2001).

Cued Speech Fundamentals. Shull and Crain (2010) describe the fundamental principles of the Cued Speech system. In the manual cueing system, there are two parameters:

hand shape and hand location. In the Cued American English system, eight hand shapes represent consonants and four locations represent vowels and dipthongs. Phonemes that look the same on the mouth (e.g. /m/, /b/, /p/) are coded on different hand shapes and phonemes that look different (/m/, /f/, /t/) are grouped together (Hage & Leybaert, 2006). The system is used in conjunction with the natural mouth movements of spoken language to clarify ambiguity in lip-reading. The authors explain, "Information given by the cues and information given by lip-reading are thus complementary" (Hage & Leybaert, 2006, p. 193). Shull and Crain (2010) clarify that speech features (such as voice, manner, or placement) or phonetic information are not coded on the system. There is not a direct correlation with orthography as the system is used to represent the phonology of a language and there is not always a direct match between pronunciation of a word and its written form. Words can sometimes be spelled the same, but have different pronunciations, such as *dove* (past tense of dive) and *dove* (a white bird) (Shull and Crain, 2010). CS can be used with or without the presence of auditory information. Shull and Crain (2010) explain that "phonemes of a language can be considered independently of speech sounds" (p. 37). In other words, an individual's access to audition can support their understanding of phonology, but Cued Speech allows full access to phonology independent of degree of deafness. The authors further clarify that while Cued Speech is "often described in terms of isolated phonemic values" (p. 37) the cues have infinite arrangements. The system can be used to clarify an isolated phoneme (/m/), a cued consonant-vowel syllable (ri), a consonant cluster (/st/), a morphemes (past tense –ed), pluralization, words, sentences, and connected speech. While some deaf children may need explicit instruction in the rules of language, grammatical rules and syntax of a traditionally spoken language can be acquired through natural exposure to Cued Speech (Shull and Crain, 2010).

Evidence exists that deaf individuals, even severe and profoundly deaf individuals, who use the Cued Speech system, are able to acquire literacy skills like their hearing peers (Wandel, 1989). Speech perception increases from 30% to as much as 95% with the addition of Cued Speech (Nicholls & Ling, 1982). Rhyme generation in deaf children, across languages, such as French and English is similar to hearing peers of the same age (Leybaert & Charlier, 1996; LaSasso & Leybaert, 2003). The Cued Speech system, partnered with an Orton-Gillingham approach, may prove to be a powerful approach in the deaf education literacy debate. While the Cued Speech system allows for complete, visual access to a spoken phonology, an Orton-Gillingham approach addresses the need for an evidence-based reading program that targets the skills specified by the National Reading Panel (2000).

Cued Speech and Literacy Development in Deaf Children.

***Cued Speech and Speech Reception*.** Numerous scholars have analyzed the phonological benefits of Cued Speech (Wang, Trezek, Luckner, & Paul, 2008; Koo & Supalla, 2010; Alegria, 2010) and its subsequent impact on literacy (Wandel, 1989; Leybaert, Colin, & LaSasso, 2010; LaSasso & Crain, 2010; Koo, Crain, LaSasso, & Eden, 2010; Crain & LaSasso, 2010). Hage and Leybaert (2006) explain that alternative oral approaches in deaf education are "often unsuccessful because children with significant hearing losses do not have full access to all necessary linguistic contrasts" (p. 195). Spoken language comprehension and differentiation of the grammar and phonology of a language is a challenge due to the imperfect signal received through residual hearing or lipreading (2005). In a one-to-one conversation, only one fourth of lipreading is intelligible by deaf individuals (Liben, 1978; as cited by Hage & Leybaert, 2006). Deaf children, with typical intelligence, still lag behind their hearing peers in phonological representations such as speech perception, speech production, oral language development, and

metaphonological abilities (Leybaert & Alegria, 2003). This limited access to spoken language has a profound impact on the development of literacy skills. Leybaert and Alegria (2003) explain that "the most likely explanation of these findings lies in deaf children's reduced access to oral language through lipreading" (p. 261). What we hear, therefore, is not a purely acoustic process, but is influenced by what we see. Research suggests that CS provides a parallel visual phonology to what we previously conceived as a purely auditory phonology. Numerous studies discuss the influence of visual information, such as lipreading, on auditory information, in what is known as the McGurk Effect (McGurk & MacDonald, 1976).

This access to spoken language and phonological processing is a critical underpinning to literacy if one believes that spoken language is necessary, but not sufficient, for literacy achievement. Torres et al. (2008) reiterates that reading abilities are directly related to "excellent competence in English oral language." As described by Hage and Leybaert (2006), several studies in both English and French have analyzed speech reception skills with the addition of CS (Nicholls & Ling, 1982; Perier, Charlier, Hage, & Alegria, 1988; Alegria, Charlier, & Mattys, 1999). Nicholls and Ling (1982) assessed profoundly deaf children who received CS instruction for at least three years. Speech reception scores improved from 30% for syllables and words with only lipreading to more than 80% when cues were added. Perier et al (1988) analyzed how sentences with a simple subject-verb-object structure are perceived with the addition of CS. Children were presented with a target and three distractors where all the sentences looked identical by speech reading alone. The addition of CS improved sentence reception, and there was a greater benefit when the sentence similarities were more challenging. Children who received CS at an early age, and at home in addition to school, received more benefit than those who received CS only at school. Hage and Leybaert (2006) speculate that

individuals, who receive CS early and at home, may be more familiar with the presented words and, thus, are better at processing phonological information.

Working memory is studied in relation to phonology as some research indicates that sequences of information are retained better through an auditory channel. The ability to code linguistic information in short-term memory (STM) predicts reading achievement (Wagner & Torgeson, 1987). Research in the area of Cued Speech analyzed whether information processed through a visual phonology was processed in the phonological loop of working memory, similarly to acoustic information. Wandel (1989), in a doctoral dissertation, compared 90 children who were deaf or hard of hearing to investigate working memory, *internal speech ratio* (Conrad, 1979), and the impact of Cued Speech on literacy. Thirty students were from a total communication program, 30 from an auditory-oral program, and 30 students were from a Cued Speech program. 15 students from each group were hard of hearing and the other 15 were deaf; 30 students were in a hearing control group. Wandel (1989) found that ISR was significantly higher among children in the CS group and oral groups than children from the total communication group. Her results found that CS supports the development of the articulatory loop, similarly to processing phonological information through an auditory or acoustic channel. Most significantly for the purposes of the present study, Wandel (1989) found the all 30 students in the CS group read at or near grade level when compared to their hearing peers, which was not the case for the oral or sign communication group.

Cued Speech and Rhyme Judgment. Rhyme judgment is a good predictor of reading skills (Charlier & Leybaert, 2000; Trezek & Wang, 2006) and is often studied as an indicator of literacy achievement. Studies of Cued Speech and rhyme judgment demonstrate that exposure to Cued Speech facilitates rhyming in deaf individuals who are capable readers (Charlier &

Leybaert, 2000; Leybaert & Lechat, 2001; LaSasso, Crain, & Leybaert, 2003; Colin, Magnan, Ecalle, & Leybaert, 2007). Charlier and Leybaert (2000) compared the rhyme judgments of deaf, French-speaking, pre-readers from oral, signing, and cueing backgrounds with a hearing control group. They believed that users of Cued Speech would not be misled by spelling similarities or lip-reading similarities. Picture word pairs were presented in four conditions: 1) rhyming words that were orthographically similar; 2) rhyming words that were dissimilar; 3) non-rhyming words that looked similar through lipreading; and, 4) non-rhyming words, that that looked dissimilar through lipreading. Results demonstrated that children exposed early to Cued Speech were not influenced by spelling similarities in words and they also had equivalent rhyming ability to hearing children of the same chronological age. Students from signing and oral backgrounds as well as students who received Cued Speech only at school relied on orthography and lip-reading to identify rhymes. Like the hearing students, children with consistent access to Cued Speech, developed rhyming skills commensurate for their age. This indicated a phonological sensitivity and understanding of the sound structure of words.

The experiment was repeated by LaSasso et al. (2003) with 30 English-speaking children. Twenty deaf individuals from Cued Speech (CS) and non-Cued Speech (NCS) backgrounds were compared to ten hearing comparison group for consistent orthography to phonology (O-P) rhymes and inconsistent orthography to phonology (I-O-P) rhymes. Students were given word lists and they had to write as many rhyming words as possible for each target, with a reminder that rhyming words could be orthographically different. Results demonstrated that the Cued Speech group performed similarly to the hearing group and relied more on phonology than the non-Cued Speech group. The authors concluded that Cued Speech should be used to support phonology and reading ability in deaf children.

Colin, et al (2007) assessed twenty-one, six-year-old deaf and hearing pre-readers on rhyme decision and rhyme generation tasks. Students were reassessed a year later in rhyme decision, a phonological common unit identification task, and written word recognition task. The researchers wanted to know if phonological awareness was necessary prior to the reading process. Researchers found that phonological skills, prior to reading, predicted written word recognition the following year for both the deaf and hearing group. Early exposure to Cued Speech was another predictor of written word and phonological processing. Children who received Cued Speech at home achieved a reading age similar to that of the hearing children (7 years, 3 months) while children who were raised orally or received Cued Speech only at school scored eight months behind the hearing children (6 years, 7 months versus 7 years, 5 months). Also, children who received Cued Speech at home made spelling errors based on phonological patterns while the other students made errors that were visually similar. The authors concluded that deaf children have the capacity for phonology through Cued Speech and those who acquire phonology prior to the reading process are able to use this capacity during reading instruction.

***Cued Speech and Reading Comprehension*.** Deaf children, who are raised with Cued Speech, have a literacy advantage (Leybaert, Colin, & LaSasso, 2010) at not only the alphabetic stage of reading, but also at the comprehension level (Torres et al. 2008). As discussed previously, infants and young children exposed to Cued Speech come to the reading process with comparable morphosyntactic abilities through a visual manner (Hage & Leybaert, 2006). Phonological studies demonstrate that cuers can perceive phonology of a spoken language, in addition to its syntax, and morphology (Alegria, et al., 1999; Nicholls & Ling, 1982; Torres et al., 2006). This enables them to become autonomous readers because when they decode a word they have a mental representation of the print (Leybaert & Alegria, 2003). Cued Speech,

whether used as a communication modality or a multisensory system for conveying visual phonology, provides for a deaf or hard of hearing individual, access to the identical phonology that a hearing individual is able to acquire, through a visual means (Koo & Supalla, 2010; Alegria, 2010; Leybaert, Colin, & Hage, 2010). This access to phonology, and to a traditionally spoken language, whatever one's degree of hearing loss, primes the reading process because when Cued Speech users decode text they have a linguistic match to the printed word in their lexicon (LaSasso & Crain, 2010).

Torres et al. (2008) describes that following the acquisition of phonological awareness, the alphabetic principle, decoding, and word recognition at the bottom-up processing level, children must then have the knowledge base to understand messages derived from the text. The authors elaborate that comprehension, "includes background knowledge about facts and concepts, a broad and deep vocabulary, familiarity with syntactic and semantic sentence structures, verbal reasoning abilities, and knowledge of literacy conventions" (p. 38). To become a high level reader, one must be able to do all of these processes "interactively" and difficulty with reading comprehension can be a result of any of the above processes.

In a study in Spain, Torres et al. (2008) compared students with cochlear implants who used the Spanish version of Cued Speech (MOC group) against two control groups, a group of chronologically matched hearing students (CA group), and a group matched for reading level (RA group). While research demonstrates that cochlear implants can provide better access to oral language, difficulties in language and literacy remain (Mukari, 2007; Nicolas & Geers, 2003). Torres et al. (2008) elaborates that even hearing individuals, with strong linguistic competence, can have difficulty acquiring literacy. Torres et al. (2008) wanted to investigate how the addition of Cued Speech would mediate these difficulties.

The authors examined both linguistic competence, a prerequisite for literacy, with the Spanish version of the CELF (Clinical Evaluation of Language Fundamentals) and reading comprehension, using a standardized reading assessment (the Spanish PROLEC-SE test). They designed an experiment to see whether the students, "could activate interpersonal schemas with an emotional content while they read the text…supplied" (p. 42). Participants had to read stories where information was not explicit in the text about the emotional state of the main character and they would need to infer the correct emotional state. One critical sentence in each story was either congruent to the emotional state of the character or incongruent. Participants read 25 congruent stories, 25 incongruent stories, and 30 filler stories. Results demonstrated that on text comprehension, the MOC group scored between 86 to 97 percent, demonstrating not only higher reading skills when compared to other deaf groups, but also demonstrating higher reading skills than the hearing control group matched for chronological age and equally to the hearing group matched for reading ability. The authors concluded that the addition of Cued Speech for students with cochlear implants, included in their study, had unlimited access to spoken language, from both parents and a school program that supported that linguistic and cognitive development using both approaches. This linguistic competence enabled the students to achieve not only equally, but better, than their hearing age-mates. In contrast to comprehension studies of non-cueing deaf students by Kelly and colleagues (2001) and Marshark et al. (2009), this study demonstrates that with the right supports, such as Cued Speech and appropriate literacy intervention, deaf students can achieve literacy comprehension comparably, or even better, than their hearing peers.

Cued Speech and Visual Phonics. Cued Speech is not the only system to convey a visual phonology. Other systems, such as Signing Exact English or Manually Coded English, have attempted to convey English in a visual manner, by placing signs in English word order.

These systems have not succeeded, however, in visualizing the phonology of spoken languages and have, thus, not impacted literacy levels among deaf individuals (LaSasso and Crain, 2010). See the Sound-Visual Phonics is a more recent addition to the systems available to deaf educators to address the issue of literacy among deaf individuals.

Visual Phonics was created by a parent of three deaf children in the 1980s as a way to support their literacy acquisition. The system visualizes 45 individual phonemes on a hand cue, plus the silent e. Few published articles exist on this approach, although it is gaining popularity at schools for the deaf. One quasi-experimental study of 23 deaf students (Trezek & Malgrem, 2005) used the Visual Phonics system with the first 20 lessons from a Direct Instruction computer program, Decoding A, Baldi. The study found that students made significant gains compared to the group who received no phonics instruction, but results could not be solely attributed to Visual Phonics because it was part of a phonics treatment package.

Several key differences make Cued Speech the more viable option for the purposes of this study. Visual Phonics does not blend phonemes together and cannot be used to visualize words, phrases, sentences, or connected speech. The grapho-phonemic assembling process consists of more than individually matching one grapheme to one phoneme. The ability to rhyme, or read a whole syllable, are other critical structures in the reading process (Crain & LaSasso, 2010). Researchers explain, "A simultaneous correspondence may also be established between multiple graphemes and multiple phonemes…The existence of intermediate reading units between the whole word and the letter level is established and accepted by many specialists" (Transler, Leybeart, & Gombert, 1999, p. 125). It is unclear from the limited published research on Visual Phonics, how literacy can be taught beyond the initial sound-letter phase. Once students are able to match an individual phoneme to grapheme (such as the

phoneme /d/ to the grapheme [d]) the system cannot visualize the next steps in the learning sequence such as decoding whole words. For some students with intact spoken phonologies, with weak decoding skills, it may be enough to only have a visual representation of an isolated phoneme. For the majority of deaf students with poor phonological access, however, they need visual access to a traditionally spoken language. Several Cued Speech studies demonstrate that students who receive more access to Cued Speech (and thus, more visual phonology) have higher literacy levels and this is theorized to be a direct result of increased access to a traditionally spoken phonology (Perier, et al, 1987). The Visual Phonics system does not address the issue that spoken language (whether perceived auditorally or through visual cues from Cued Speech) is a prerequisite for literacy (Koo, 2009; see Allen, et al, 2009). While reading, for example, students do not decode one sound at a time, but read sounds as whole units (Transler, Leybaert, & Gombert, 1999). In one DIBELS reading assessment test item, for example, students are asked to listen to individual sounds such as /s/ /a/ /t/ and say /sat/. In another task item, students are expected to decode sounds individually and then blend them into a word. In the Visual Phonics system, it is not possible to visually represent /sat/ as a whole word, but only to represent each sound individually. Further study is needed comparing Cued Speech to Visual Phonics and whether visual access to isolated phonemes is sufficient in literacy acquisition for the deaf. In the present study, subjects will have access to the English language via Cued Speech and the cueing system will be used to visualize all aspects of the Orton-Gillingham program, whether presenting isolated phonemes, syllables, and words, in addition to providing access to the lexicon of English.

CHAPTER III.

METHODOLOGY

The purpose of this study was to assess the outcomes of an Orton-Gillingham approach used in conjunction with Cued Speech, on the five areas recommended by the National Reading Panel (2000) with deaf students. Areas addressed included phonemic awareness, alphabetic principle, text fluency, vocabulary, and comprehension. Five students were studied during the 2011-2012 school year in their reading progress using the PAF, Orton-Gillingham based curriculum.

Design

The research design was a qualitative case study using numerical data in addition to field notes. A case study design was used for several reasons. The present study was an intervention study and required specialized skills on the part of the instructor, i.e. mastery of Cued Speech and knowledge and skill of implementing the Orton-Gillingham method. A case study supported detailed analysis of an unexplored phenomenon and also allowed for the researcher to examine individual student progress across multiple literacy domains. Alternative methods were not chosen for the following reasons:

1. Neither an experimental design, with random assignment, nor a quasi-experimental approach was possible because
    a. A sufficiently large enough n was not possible given the unique nature of the investigation and the availability of a sufficiently large enough pool or population of children who are deaf, use Cued Speech and were exposed to the Orton-Gillingham approach to draw upon in general and more specifically locally

b. an applied behavior analysis design was not possible since the sample participants, that were available, received aspects of an Orton-Gillingham approach at differing times during the school day thus, obviating the use of multiple base line or changing criterion design. Also given the nature of the intervention, it was not possible to use a reversal design.

c. Further restricting the possible pool of participants was extreme diversity of other student characteristics due to differences in hearing loss, grade level, age, linguistic ability, additional disabilities, family background, level of instruction and frequency of interaction with this teacher-researcher, and so on, making comparisons between students challenging.

Crain and Kluwin (2006) discuss whether validity samples are even possible in research of the deaf and hard of hearing. While there is emphasis on the use of randomized trials, intervention controls, and sampling procedures, the gold standard of research, Crain and Kluwin (2006) assert that the population of children who are deaf and hard of hearing is a low incidence disability and "we do not have the luxury of a large homogenous population to draw samples from" (p. 115). Crain and Kluwin (2006) explain that the deaf population is heterogeneous due to various communication modalities, additional disabilities, racial and economic differences, educational backgrounds, and an array of amplification, such as hearing aids and cochlear implants that may further be confounded by consistency of duration and benefit of use, variables that do not come into play with children with high incidence disabilities. While the authors explain that 30 subjects is considered minimum for special education research, this is rare in a

review of the literature in the *American Annals of the Deaf* and the *Journal of Deaf Studies and Deaf Education* (Crain and Kluwin, 2006) and they discuss options for this evidence-based research dilemma. They explain that, "each study provides a glimpse into a particular phenomenon or problem" (p. 120). Crain and Kluwin (2006) elaborate that repeating these studies provides a "wider view" and might provide useful insights, particularly if multiple instances of the research can be evaluated, as was the case in this multiple case study.

Participants

Participant Selection. Given the dilemma of sample size and randomization, subjects were selected through *purposeful maximal sampling* (Creswell, 2007) from the available students in the researcher's teaching caseload. The diversity of subjects provided information about the impact of an O-G approach across different grades, ages, and linguistic ability levels. Five students, across several grade levels, were selected to represent a range of impact of the O-G program used in conjunction with Cued Speech. The researcher had a total of fourteen students who received an Individualized Education Plan, but not all of the students met the criteria for the study. The need for intervention was based on students who received English Language Arts instruction from the researcher, as a function of having an Individualized Education Plan specifying as such, and also met the district guidelines for receiving O-G instruction. Students had to receive O-G instruction if they did not meet benchmarks on the DIBELS benchmark assessment in grades kindergarten through second grade. Two fifth graders were also selected for this study in that they currently received O-G instruction, due to the presence of learning disabilities and significant reading delays, in addition to their hearing loss.

Participants' Background. Five participants, across three public elementary schools, were selected for the study, based on their need for O-G instruction as mandated by the public school district. The participants were all deaf or hard of hearing, had low socioeconomic status,

and were Hispanic in origin. Four participants had non-English speaking parents. Of the selected participants, all five had access to an FM system, and four had bilateral hearing aids. They were auditory-oral students in that spoken language was their primary means of communication. One participant was in kindergarten, one in first grade, one in second grade, and two participants were in the fifth grade. Four of the five students had a secondary or tertiary disability in the area of learning, cognition, or attention. All five students received O-G instruction via Cued Speech, or Cued American English, as their spoken language was delayed. One student did not begin learning language until age four and half, when the student was first fitted with hearing aids. This student was acquiring both English and Spanish simultaneously and had no language dominance. Two participants were also identified in a vision screening, by the nurse, as visually impaired and one of them began wearing glasses while the other was not fitted with glasses. One student was retained due to cognitive tests falling within normal limits, but presented with significant delays in language, and was repeating kindergarten. This information is summarized in Table 1.

Table 1. Demographics of Participants

Participant	Gender	Age	Hearing Loss	Additional Disabilities	Classroom Placement	Current Reading Level
'Marta'	F	6	severe bilateral, hearing aids, and FM	wears glasses	collaborative team teaching	DRA 2
'Angela'	F	7	mild bilateral, hearing aids	learning disability, low average cognition	collaborative team teaching	DRA 1
'Jacob'	M	7	severe right ear, mild conductive left ear, FM	possible learning needs	collaborative team teaching	DRA 10
'John'	M	10	mild to moderate bilateral hearing aids and FM	learning disability, behavior, attention	self-contained	DRA 24
'Diana'	F	10	severe bilateral, hearing aids and FM	learning disability, low average cognition	special class for ELA and resource, mainstreamed for other subjects with teaching assistant	DRA 28

Setting. Research and data collection took place in a public school district in a New York City suburb. The students available for participation were located across three different elementary schools in the same school district. This researcher saw students in a small resource room, as assigned by the administration. Students were seen for Orton-Gillingham instruction on a one-to-one basis.

Contextual Information. All five students were classified as hearing impaired on their Individual Education Plan, but four received special education support in inclusion classrooms and one student was in a self-contained setting. Four students received additional English Language Arts support outside their hearing education services. One student received an hour and half of English Language Arts instruction from this researcher and the PAF program was only one aspect of what was required from the student, in addition to reading and writing units mandated by the district. All of the students did not receive PAF instruction in isolation during hearing services. Other areas of need, based on their IEP goals, were also worked on during sessions. They received auditory training, grammar and language instruction, and class content review and preview as indicated on their education plan.

Students received Orton-Gillingham instruction in addition to reading programs used in the general education classroom. All students in the district, including the five in this study, were also tracked by ability level for forty minutes in an intervention block. This intervention block focused on skills students needed for standardized test preparation, and some of the skills included comprehension strategies as part of guided reading, text fluency, and decoding strategies with the PAF curriculum. This researcher did not have control over the classroom reading program, the intervention block pull-outs, or the guided reading instruction. One special education teacher, who worked with a student in the study, used a variety of materials to support

the student during her reading instruction periods. When the district requested that all special education teachers maintain consistency across programs, she decided to continue using her materials. As a result, this one student received the PAF program during hearing services, guided reading in the regular classroom, and multisensory support unrelated to PAF from another resource teacher. A meeting was convened about the multiple programs in place, but the resolution was that each professional would continue working in their area of expertise. One student received an additional period of PAF Orton-Gillingham instruction from the inclusion special education teacher, in addition to this researcher.

Materials

***Preventing Academic Failure*.** The *Preventing Academic Failure* O-G curriculum was chosen for this study because it was currently being implemented in the district. Consultants, materials, and three days of training were provided to the researcher. The district expected all special education teachers to use this approach with students who scored below grade level and did not meet the benchmarks on their reading assessments. There were no previous studies on student outcomes with the PAF curriculum, but according to Sally Shaywitz (2003), a leading expert on dyslexia and a member of the National Reading Panel, explains:

> "You will hear many claims of the superiority of one [Orton-Gillingham] program over another. The good news is that the evidence-based programs are all highly effective and produce remarkably comparable results. According to the research, no one program is head and shoulders above the others. While programs emphasize different components of reading, the evidence tells us that as long as they include the essential components outlined…and are implemented by well-trained teachers with sufficient intensity and for the necessary duration, they are all effective" (p. 268).

Direct instruction was provided, using the PAF program, in the five areas recommended by the National Reading Panel (2000) including phonemic awareness, alphabetic principle, accuracy and fluency with text, comprehension, and vocabulary. The program was taught using multisensory strategies and delineated the rules for learning the written form of the English language into over 250 lessons. Each lesson taught one rule and the subsequent lessons built upon each previously learned rule. The program included frequent repetition and repeated practice until students mastered a skill. Students received the instructional methodology at regular intervals, either from this researcher or from a combination of this researcher and an additional teacher. All five students received the intervention previously and were already matched to a particular level in the program. Each direct instruction lesson included: 1) review of phonemic awareness and sound-letter correspondence; 2) review of sight word recognition; 3) direct instruction of new material; 4) skywriting sounds and difficult words to spell called 'red words'; 5) using letter tiles to practice new language rules; 6) teacher orally dictated sounds, words, phrases, and sentences that students had to write in a notebook to physicalize and practice the rule; 7) handwriting of lower or upper case letters taught in a prescribed progression, 8. reading words, phrases, and sentences that followed the rule; 9) reading short passages from basal readers that incorporated the new rule and previously taught rules; and 10) completing comprehension and vocabulary activities that corresponded to the lesson.

Cued Speech. The use of Cued Speech supported student access to traditionally spoken English phonology so that no student was at a disadvantage in terms of access to English, based on their hearing needs. Students only received Cued Speech during instruction from this researcher and did not receive it from other providers or caregivers. The system was used to clarify instruction from the researcher, prompt and correct English pronunciation, and to serve as

a tool to help students remember sound-letter correspondence and correctly blend sounds into words, phrases, and sentences.

Instrumentation

***DIBELS*.** DIBELS or the *Dynamic Indicators of Basic Early Literacy Skills* is a data system that tracks and measures student progress in the five areas necessary for literacy acquisition: phonemic awareness, alphabetic principle, vocabulary, comprehension, and fluency with connected text, as recommended by the National Reading Panel (2000). DIBELS is operated by the Center on Teaching and Learning (CTL) at the University of Oregon. The DIBELS data system is used in over 15,000 schools and has been used to assess literacy since 2001. According to the DIBELS website, "the DIBELS® measures link together to form an assessment system of early literacy development that allows educators to readily and reliably determine student progress. School personnel can utilize the DIBELS Data System reports to make instructional decisions about children's reading performance." Sub-tests are summarized below:

Initial Sound Fluency (ISF). This measure identified a student's phonological awareness within a minute. Students looked at a set of pictures and identified pictures that corresponded to initial sounds presented by the teacher. The teacher said, "point to the picture that starts with /b/.

Letter Naming Fluency (LNF). This subtest provided a measure to assess risk of future reading difficulties. Students identified upper and lower case letters in a minute.

Phoneme Segmentation Fluency (PSF). This was a test of phonological awareness and was a predictor of later reading ability. Students had to segment words into phonemes. If the teacher presented the word 'cat,' the student had to segment /k/ /ae/ /t/.

Nonsense Word Fluency (NWF). This was a measure of the alphabetic principle and phonological recoding. Students read nonsense words and the teacher recorded their miscues. A score was given based on correct letter sound correspondences and words recoded completely.

Correct Letter-Sound Correspondences (CLS). The teacher counted the number of correct letters the studentd pronounced. In the nonsense word 'jut', for example, if a student read /jaet/, they received two points for correctly producing the beginning and ending sounds.

Words Recoded Completely (WRC). The teacher gave a score for the number of words a student correctly read or 'recoded', referring to the student decoding the sounds and then blending the sounds into a word.

Word Use Fluency (WUF). This subtest measured vocabulary and oral language. The teacher said one word at a time and the student had to use the word in a sentence. The teacher gave a score based on the number of words used in correct sentences.

Oral Reading Fluency (DORF). This measure identified accuracy and fluency with text. The students read three passages and the researcher recorded the number of words read correctly in a minute for each passage. A median score was given based on the three passages.

Retell Fluency (RF). This subtest provided a comprehension measure for the DORF subtest. The researcher asked the student to retell what happened in each DORF passage. A score was given based on the number of words used in the retell, taking into account details such as off topic conversation, irrelevancy, and repeating the retell. A median score was selected from the three retells.

There are currently numerous studies analyzing the validity of the DIBELS, due to the widespread use of the assessment throughout public schools (Goffreda & DiPerna, 2010;

Paleologos & Brabham, 2011; Shelton, Altwerger, & Jordan, 2009). Goffreda and DiPerna (2010) reviewed 26 studies to examine current psychometric evidence for the DIBELS. They found strong reliability and validity for DIBELS Oral Reading Fluency (DORF), but there was wider variation for the other measurements. The authors suggest that addition research is needed to see the impact of the DIBELS for guiding classroom instruction. Overall, they found strong empirical evidence for the reliability of the DIBELS measurements.

Paleologos and Brabham (2011) compared DIBELS Oral Reading Fluency test scores with the SAT-10. They found that the DORF subtest predicted scores for high-income, but not low-income students. There were statistically significant differences in fluency, comprehension, and vocabulary between the high and low income group. Reading fluency did not correlate with reading comprehension for low-income students. Other authors find it controversial that districts are pressured into using the DIBELS measurements and suggest that there is a relationship between the authors of the DIBELS and state official that require the use of the test (Shelton, Altwerger, & Jordan, 2009). Shelton et al. (2009) also raises the concern that the DIBELS uses a one minute measurement to determine reading levels and whether that is an acceptable measurement of a student 'at-risk.' Kaminsky and Good (1996) counter that the DIBELS measurements "are not intended to be exhaustive of all important skill areas for young children" (p. 216).

This assessment was administered three times, during benchmark periods for the fall, winter, and spring. Students had one minute to complete each subtest. Students received benchmark scores that gave them a status of: 'at risk,' 'some risk,' and 'low risk' and at other benchmarks: 'deficit,' 'emerging,' and 'established'. Expected scores varied for each subtest at different benchmarks and in different grades. A score of 'low risk' or 'established' both

indicated that the student met the benchmark. A score of 'at risk,' 'some risk,' 'deficit,' or 'emerging' indicated that the student needed continued support in that literacy area. The Dynamic Measurement Group, Inc. elaborated,

> "DIBELS benchmark goals are empirically derived, criterion-referenced target scores that represent adequate reading progress. A benchmark goal indicates a level of skill where the student is likely to achieve the next DIBELS benchmark goal or reading outcome. Benchmark goals for DIBELS are based on research that examines the predictive validity of a score on a measure at a particular point in time, compared to later DIBELS measures and external outcome assessments. If a student achieves a benchmark goal, then the odds are in favor of that student achieving later reading outcomes if he/she receives research-based instruction from a core classroom curriculum" (DIBELS Technical Manual, 2011).

By using data triangulation, weaknesses in the DIBELS assessment were supported by information from the other assessments, as outlined below.

PAF Test of Single Word Reading (PAF-TOSWR). The PAF-TOSWR tested the ability of a student to read words in isolation. According to the authors, "the ability to read single words automatically, at the word recognition level, is crucial for maximizing comprehension" (Retrieved November 29, 2011; www.pafprogram.com). This assessment contained 240 words separated into twelve subtests. The subtests were based on phonological patterns that followed the sequence of PAF. Students demonstrated progress by increasing the number of words they could read accurately. Their scores were calculated by adding the number of words recognized and the words decoded together and multiplying by five to receive a percentage. A conversion table of percentages was included with the assessment. The PAF-TOSWR was untimed.

There are no validity or reliability studies for PAF, with either hearing or deaf children, but using the PAF assessment was still a method of tracking student progress within the program. The PAF test assessed print word knowledge from each of the program levels so a percentage of change could be calculated for each level. It allowed the researcher to see if the students were making progress specifically in the areas being taught. This test was not used for student

comparisons across grades or standardization, but it was used to compare students' scores to their own previous scores.

Developmental Reading Assessment (DRA2). The Developmental Reading Assessment-DRA2 (Beaver & Carter, 2009; Retrieved December 5, 2011, www.pearsonschool.com) was used in kindergarten through eighth grade to assess reading ability, including phonemic awareness, fluency, vocabulary, and comprehension in order to make placement and curriculum decisions. The DRA was administered by the classroom teacher, each benchmark, who listened to the child read and collected a miscue analysis of the reading. The teacher then had the student retell the story and asked the child questions about the text. It was the teacher's responsibility to select the story for the child based on where the teacher assumed they are probably reading. If the story was too easy or too difficult, the teacher selected a different story. In kindergarten through second grade, scores ranged from 0 to 44, with 2 (emergent level) being the benchmark for kindergarten. The benchmark at the end of first grade was 16 to18 (early level). The benchmark for the end of second grade was 24 to 28 (transitional level). Benchmark scores indicated the independent reading level of each student. A benchmark score indicated the child read with 94% accuracy and comprehension. The DRA was highly variable because teachers gave students a score based on how they viewed the reading performance of the child. In later grades, in addition to an interview about the text, students wrote answers to comprehension questions. Despite the flexibility of teacher scoring, DRA studies reported a strong correlation between DRA scores and other standardized test measures for criterion validity, or testing the effectiveness of predicting behavior on the test (Weber, 2000). Weber (2000) studied the similarity between scores on the DRA and the Iowa Test of Basic Skills with 284 first- through third-graders. He also compared the DRA to scores on an assessment called the *Aprenda* with

another set of 326 first-through third-graders. There was a moderate similarity between test scores. Several studies examined the construct validity or the ability to measure fluency and reading comprehension using the DRA (Williams, 1999; Wright & Stenner, 1998). Williams (1999) examined the reading levels determined by the DRA and compared them to scores on the Iowa Test of Basic Skills. Second grade student (N=2,470) scores were correlated between the two assessments during the 1998-1999 school year. There was a significant correlation (.01 level) on reading comprehension, vocabulary, and total reading on both tests. The greatest correlation was total reading and independent reading level. Wright and Stenner (1998) examined the connection between the running record component of the DRA to the Lexile Framework for Reading assessment. This study found a low correlation between these assessments (.69). Only 259 students had matching scores between the two tests, out of 1,140 students who took both assessments. The DRA technical manual (2003) explains this discrepancy is due to the variation in text difficulty ranges. The DRA range of students tested varied between level 9 and level 30 while the Lexile Scale ranged from 200-1700. In a review by Beaver (2006) the author explained that teachers reported that the test appropriately covered a range of reading and that it was useful for planning instruction, but the test is difficult to administer to large groups due to the time commitment for each student which is approximately 30 to 45 minutes. Beaver (2006) concludes that the DRA is not a good instrument for progress monitoring due to its lengthy requirements. By using data triangulation, however, the weaknesses of each assessment were supported by information from other assessments.

Procedures

Treatment occurred during the 2011-2012 school year. The intervention was currently in place throughout the school district among all special education teachers. As a result of the

students with disabilities sub-group impacting the annual yearly progress (AYP) mandate of No Child Left Behind (2001), administration provided training in the *Preventing Academic Failure* curriculum with the expectation that teachers would use this program with any struggling learners who had reading goals on their IEP or who did not pass state exams with a score of three or four.

The Orton-Gillingham, PAF program was administered and data were collected, as required by the school district throughout the year. The five students received Orton-Gillingham in different intensities, based on their individual services received from this researcher. The kindergarten child received PAF on a daily basis as she received daily instruction from this educator. The first grader received PAF two times per six day cycle for 40 minutes. Additionally, the student received PAF from another special education teacher during an intervention block. The second grader received PAF on a daily basis from either a special education teacher or from this researcher because the student was seen by this researcher on three days out of a six day schedule and he was seen by another teacher on the other three days of the cycle. One fifth grader received PAF on a daily basis, but only for 20 minutes due to the time constraints of having to teach thematic literacy units, in addition to the skills expected in the PAF program. Another fifth grader received PAF two times per six day cycle for 40 minutes, and in addition, this student will received parts of PAF on the other four days by a self-contained special education teacher.

Data Collection

Data triangulation increased the credibility and trustworthiness of the case study. Documented teacher and professional comments and impressions of the particular child in their classroom, pull-out, or consultation situations were collected with regard to the child's overall

functioning, their initial functional status with regard to reading related activities, and the child's progress so far. This information was culled from the children's IEP and other ongoing documentation. This, along with three assessments and field notes, served as the data set. Test administration included:

1) The administration of the *DIBELS*, administered by this researcher in the fall 2011, winter 2012, and spring 2012 according to the district mandated testing period. Test administration of the assessments was part of routine practice in the school district and would be given regardless of the current study;

2) The DRA, or Development Reading Assessment, as there is debate in the literature as to whether the Oral Reading Fluency assessment of the DIBELS adequately measures comprehension (Shelton, Altwerger, & Jordan; 2009). The DRA was used to support data triangulation and additional information regarding phonemic awareness, fluency, and comprehension;

3) The PAF Test of Single Word Reading was used to document growth specifically within the PAF program. This assessment was administered in the fall of 2011, winter 2012, and spring 2012 during the same period of DIBELS administration.

4) The data collection procedure of *field notes*, tracked qualitative information that was noticed by the researcher, such as language use or comprehension strategies, and recorded observations and data over time that periodic assessments were not able to capture; and

5) Interviews with the students' classroom teacher, in the spring, provided information on how instruction in PAF was impacting the students in the classroom. The five students were not formally interviewed, regarding their progress, as three students were unable to use language at that level, but ongoing comments by the students, regarding how they viewed themselves as

readers, were collected and discussed in the field notes. Interviews were coded by themes, as they related to the research questions, and were analyzed through the 'constant comparative' method, where results were compared to other results (Creswell, 2007).

Credibility and Trustworthiness

Data triangulation was used to increase the credibility and trustworthiness of the study and reduce the possibility of bias on the part of the teacher-researcher. Multiple sources of information were collected to document reading progress over time in the 2011-2012 academic school year. Participants were assessed with both the DIBELS and DRA in the fall, winter, and spring. Field notes provided qualitative information about the students' progress in the program as well as perusal of teacher documents and teacher/service provider interviews and feedback. A student-teacher/researcher assistant provided inter-rater reliability on scoring the assessments. Following the administration of the DIBELS assessments, the researcher and research assistant scored the tests and then compared data until 100% agreement was reached. The DRA was an assessment that only classroom teachers were trained to administer. These data were collected after the third administration in the spring. Consistency of measurement was gained by comparing data from the DRA to data collected in the DIBELS. Overall, researcher bias was reduced, and credibility and trustworthiness was increased, through the collection of five different data sources by the lead researcher and two assistants, who provided reliability and 'verification' to evaluate the quality of data collection and analysis.

CHAPTER IV.

RESULTS

The chapter is organized as follows. First, introductory remarks will be made to review a cautionary note, followed by a section referred to as Legend, wherein there will be an explanation of the conventions used to differentiate among references to lexical items, printed words and spoken words. Each of the five case studies will then be presented, including; 1) field notes on the *Preventing Academic Failure* instructional methodology, supported with Cued Speech; 2) information to help the reader understand the three assessments; and, 3) finally, an analysis of interviews with the students' primary teachers will provide information about how the intervention supported reading in the classroom. The chapter will end with some concluding remarks.

Cautionary Note

Given how the DIBELS is constructed, and how it is administered, a cautionary note must be made so that the reader will understand why certain data are reported the way they are or are not reported on at all. As noted in Chapter III Methods, some subtests of the DIBELS are given in certain grades and not in other grades, and some subtests are administered at certain benchmark periods and others are not. The data reported below reflect these facts. As a result of the reporting of the data, or the lack of reporting, the impression might be that there was a failure on the part of the researcher to collect pertinent data, but this was not the case. The researcher used multiple assessments to address the gaps in DIBELS data collection. Additional assessments used to support the study were the *PAF Test of Single Word Reading* and the *Developmental Reading Assessment.*

Legend

Throughout this chapter the researcher makes reference to lexical items, the print form of these lexical items and their articulatory representation. In order to assist the reader the following conventions will be used. A lexical item will be italicized, such as *dog***,** *run*, *red* or *now*. The print representations of the above lexical items will be enclosed with single quote markers, e.g. 'dog', 'run', 'red' or 'now' and the phonological representations will be written in IPA symbols and bounded by forward slash marks, e.g. /dɔg/, /rən/, /rɜd/ or /nɑu/.

Case Studies

Marta. As discussed in the participant section, Marta repeated kindergarten due to her limited language and low academic performance as a result of her severe hearing loss. While data for these assessments were collected during the 2011-2012 school year, Marta needed a second year of intervention to acquire skills that other students acquired in one year. She was a year older than the majority of her classmates and had already received a year of deaf education instruction, and reading support using Orton-Gillingham methods in her first year of kindergarten. Her fall benchmark data represented progress following a year of instruction and then approximately 12 weeks off between the end of her first year of kindergarten and the administration of the test in her second year of kindergarten. The DIBELS was not used in the 2010-2011 school, but Marta had limited language and academic skills when she first started kindergarten and she scored a 0 on other assessments given the previous school year. Marta received PAF instruction on a daily basis from this researcher. In addition to PAF, Marta also received instruction in auditory habilitation, review and preview of academic content, and vocabulary development related to academic subjects.

Field Notes

Fall PAF. Marta worked through lessons 1 through 10 using the PAF pre-primer book called *Ready to Read*. These lessons taught initial sounds made by consonants, in a particular order, to get students ready for the reading process. Students are taught to connect pictures and spoken words that correspond to the letters and the sounds they make. Marta, for example, learned that the letter *m* says /m/ and learned a set of vocabulary that began with /m/. She drew pictures that represented phoneme sounds, wrote the graphemes that represented certain phonemes, and completed various multisensory activities (skywriting, drawing, dictation) to support learning of initial consonant sounds. Each lesson was reviewed and new lessons built upon previous lessons. Cued Speech was used during all educational sessions with Marta because she did not discriminate between many sounds in English; did not hear final endings, plurals, tense, and consonant clusters; and had limited access to language, prior to entering school, due to not being aided for hearing and vision. Her ability to use language was her greatest obstacle throughout the year.

Marta was taught phonemic awareness and the alphabetic principle explicitly in the program. For example, she was taught the letter 'f' and its corresponding sound, and was asked if she knew words that started with the /f/ sound. She said /fæ/ (fast), /fɔr/, and /bæləntaim/ (valentine), but pronounced the /v/ as a /b/. The difference between /f/ and /v/ was clarified with Cued Speech and Marta practiced cueing and saying words that differed by those sounds. During subsequent sessions, she was able to discriminate between words with /f/ and /v/ and she was able to correct her pronunciation with support from Cued Speech. She confused the pronunciation and deleted final consonant sounds without the cueing prompts and repeated practice. In words with the short /æ/ sound like *map* and *mat* she frequently mispronounced and

misread the words making substitutions or changing the order such as *map*→/pæm/ or *map*→/mæt/. She would also read words with final consonant deletion such as cat→/kæ/. She had visual similarity confusions with the letters [y] and [u]. She frequently misread or wrote words by inserting letters with visual similarities such as 'lad'→*gal*, 'gal'→*log*, 'gal'→*gai*, 'mad'→*mand*. Her errors were often related to her own speech patterns. All of her mistakes were supported through mediation and teacher modeling of pronunciation, or labeling the target word with Cued Speech support. Marta began to pay attention to her decoding and pronunciation errors, not wanting to be corrected. She would sometimes prompt herself with a cue for sounds that she wanted to remember such as /s/, but she did not use the system as her expressive mode of communication.

Marta's biggest obstacle was in her limited vocabulary and oral language, despite quickly acquiring strong phonemic awareness and alphabetic decoding skills. She could decode some words, but did not know what they meant and had no synonyms to relate her understanding. She could point to pictures for words she knew like cat and mom, but when asked "what is a cat?" she could not give an answer. Maria needed repetitive practice to use words in phrases and sentences to support her vocabulary and comprehension. Without support, she spoke in one word utterances. Clarification and expansion of language was provided through mediated learning, modeling, and opportunities to match the words, phrases, and sentences to pictures. Marta was given daily, extended opportunities to use her developing language as it related to the PAF reading program through discussion with the researcher (What animal is in the story? What was your favorite part of the story? What else starts with the /m/ sound?). Marta needed full modeling from the researcher to respond. When asked, for example, what animal was in the story, Marta would need a model supported with Cued Speech, "the animal is a cat."

Winter PAF. Marta continued practicing initial sounds made by letters and matching letters to corresponding pictures. The researcher had taught Marta repair strategies and requesting phrases to ask for clarification. She said, "What does this one say?" (pointing to a picture of tag), or "I forget" when she did not know the name of a picture in the letter category. Marta sometimes made mistakes by incorrectly labeling a picture without thinking about the sound and letter she was practicing. While practicing that the letter *m* says /m/ she asked if a picture of a [mat] was a pumpkin. By January, Marta had been taught the sound-letter correspondence to be able to decode "A cat sat," but she could not consistently understand the meaning. She sometimes turned red and became flustered when she forgot words that she had practiced, but now had the acquired language to say, "I don 'member" or "too hard." Marta had increased the number of words she could label and use for each sound category. She was acquiring lessons more quickly. On January 4th, following the winter break, she read 'a tag'→ /ʌ gæt/, 'A dad sad'→/ʌ bæd sæd/, and 'a mad dad'→/ʌ dæd mæd/. Two days later she correctly read the words: 'had, mad, lad, hat, am, mat, gal, sad'. At first she read 'gal' as /læd/, but she realized her mistake. With just ten weeks of Orton-Gillingham instruction, Marta had developed fluency for sound-letter correspondence for initial consonant sounds and consonant-vowel-consonant words with the /æ/ sound in the medial position. She now knew most related vocabulary for the lessons, so when the researcher asked, "What words start with /g/?" she could name the words from the curriculum from memory, select them from pictures, and provide additional examples not from the curriculum. By the end of the winter, Marta mastered the *Ready to Read* pre-primer, all related vocabulary corresponding to the program, and had learned 17 initial sound-letter rules and the /æ/ vowel sound in consonant-vowel-consonant word combinations.

***Spring PAF*.** In the spring, Marta worked through half of Book A of the PAF program. Book A has approximately 17 lessons practicing the /æ/ vowel with different consonant combinations learned in lessons 1-17. She had to practice spelling, sounds, vocabulary, and comprehension of words, phrases, sentences, and short stories. She had to now complete comprehension activities about the short stories such as sequencing, labeling vocabulary, and rules of sentence structure. Marta was now able to decode and write an increasing number of words, even if she did not know their meaning. For example, Marta practiced writing various *at* words and then asked if they were real words. She wrote: 'pat, lat, zat, dat', and 'cat' and asked if each word was real, "dis a word?" She had learned from direct instruction that some written words were real words and other words were nonsense words. She was now trying to distinguish in her own writing what were real or nonsense words. Marta was able to read short paragraphs that contained words with rules she had been taught from the program. Whatever she had been taught, she could read fluently. She needed support for multi-meaning words (*bat, tag*) and stories with prepositions (*The hat is on the cat. The cat is on the mat*.). She could now fluently read all the stories in the lessons she had been taught, but needed support to understand the meaning. She had to manipulate the images, with teacher support, to clarify the meaning. Marta was now able to read and write sight words such as: *the, of, I, a, is, to*. She could now give some definitions such as, "The boy is a man." Marta was able to correct speech errors in her own reading and understanding of her reading. She mispronounced a character "Dan" as /ʤæn/, for example, but her mispronunciation did not impact her overall understanding of the reading passage. When Marta made a mistake, she did not become as flustered and could verbalize, "I mixes up! I is no perfek!" Marta could also retell short stories that she was decoding when questioned by the teacher. She could give the main idea. When asked, "What is the story

about?" She could answer, "Nat" (a cat). When asked, "What happened to Nat?" she answered, "on the van."

By the end of the spring, Marta insisted on reading and answering the related comprehension questions with as much independence as possible. Marta was generalizing skills to words she had not been taught. She was able to decode from classroom literature words such as wind, took, and flower. She was confident in her reading, writing, spelling, and thinking abilities related to the PAF program. She saw herself as a reader and proclaimed, "I've so many *at* words! I love it!"

DIBELS. Marta's results on the DIBELS are reported in Table 2 below.

Table 2. Results on the subtests of the DIBELS for Marta

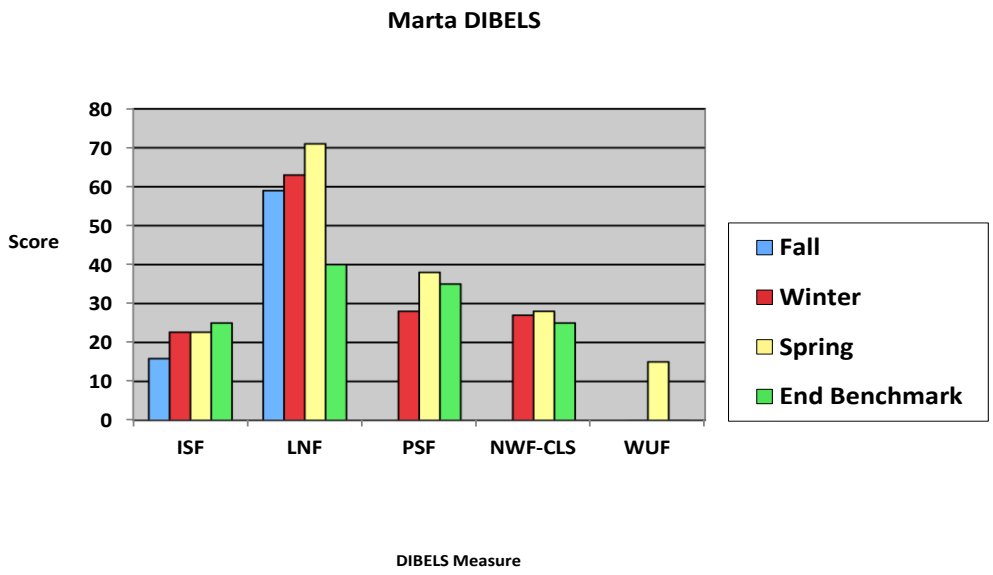
Marta	**Fall Benchmark**	**Winter Benchmark**	**Spring Benchmark**
Initial Sound Fluency (ISF)	16/8 'low risk'	23/25 'emerging'	Not administered during this assessment period[1]
Letter Naming Fluency (LNF)	59/110 Benchmark=8 'low risk'	63/110 Benchmark=27 'low risk'	71/110 Benchmark=40 'low risk'
Phoneme Segmentation Fluency (PSF)	Not administered during this assessment period	28/72 Benchmark=18 'low risk'	38/72 Benchmark=35 'established'
Nonsense Word Fluency (NWF)	Not administered during this assessment period	CLS WRC 27 0 CLS Benchmark=13 'low risk'	CLS WRC 28 6 CLS Benchmark=25 'low risk'
Word Use Fluency (WUF)[2]	0	0	15

Benchmark goals not established

[1] The DIBELS does not administer these subtests during these benchmarks. *Phoneme Segmentation Fluency* takes the place of *Initial Sound Fluency* because *Initial Sound Fluency* is not a strong indicator of being 'at risk' after the winter benchmark. *Nonsense Word Fluency* is not given in the fall benchmark because the majority of children cannot yet decode and it does not accurately identify children 'at risk' during the fall benchmark (Personal Communication, DIBELS, October 31, 2012).

[2] DIBELS has not established benchmark scores, but, "…tentatively, students in the lowest 20 percent of a school district using local norms should be considered at risk for poor language and reading outcomes, and those between the 20th percentile and 40th percentile should be considered at some risk. (DIBELS Technical Manual, 2002).

Figure 1. Comparative graphic representation of Mara's performance on DIBELS subtest across benchmark periods



Initial Sound Fluency. With her background taken into consideration, Marta was 'low-risk' in initial sound fluency at the beginning of her second year of kindergarten. Kindergarten students needed to score an 8, the average score expected by DIBELs in the fall, and she scored

16. Marta had already received PAF reading intervention for a full year prior to taking any of these assessments. This previous instruction enabled Marta to score well on the first benchmark for *Initial Sound Fluency* because the test assumes that children have limited exposure to these skills. Her score increased approximately seven points by the middle of kindergarten to 23, but she was now two points below the increased benchmark of 25. This indicated that her initial sound fluency was still 'emerging' and she continued to need intervention in this area. It is difficult to determine whether the intervention was of benefit or a hindrance to Marta in this subtest because she started above the benchmark and then was just below the winter benchmark. However, there is no spring data to determine whether this was transitory or whether she regained her performance in this area because this subtest is not given during this benchmark, rather according to the DIBELS manual (Good & Kaminski, p. 16, 2002) the teacher is to rely on the *Phoneme Segmentation Fluency* subtest, which is only given at the winter and spring benchmark periods. At the winter benchmark, both the *Initial Sound Fluency* and the *Phoneme Segmentation Fluen*cy subtests were administered. In *Initial Sound Fluency,* as noted above, Marta was two points below benchmark; while in *Phoneme Segmentation Fluency* her performance was now considered to pass the benchmark of 18, with a score of 28/72, exceeding the benchmark by 10 points. By the spring semester her performance increased again (from 18/72 to 35/72) exceeding the benchmark by 3 points, so her increase appeared to be slowing as the year progressed, although she was still above the expected level of performance.

Letter Naming Fluency. Marta was "low-risk" for letter naming fluency at the beginning, middle, and end of her second year of kindergarten. She exceeded the benchmark each testing period. Kindergarteners are expected to know at least 8 letters in the fall, then 27 letters in the winter, and finally 40 letters in the spring. She scored a 59, 63, and finally a 71, suggesting that

on this task the use of the PAF intervention, with supplemental cues, strongly supported her performance and skill attainment. Letters were taught in the program in a sequential and direct approach until mastery. She reviewed letters on a daily basis, with the support of Cued Speech, while following the PAF sequence. On the first assessment, she confused 'l' and 'i.' She also confused 'p' and 'q,' which was counted as incorrect based on DIBELS guidelines. On the second assessment, she had no incorrect letters. On the third assessment, she skipped one line, but realized her mistake within the time limit. She also lost her front teeth, which contributed to additional speech difficulties with the letters 'd' and 'z', which were not counted against her score.

Phoneme Segmentation Fluency. Marta was "low-risk" for difficulties with phoneme segmentation fluency at the middle and end of kindergarten. *Initial Sound Fluency* is the phoneme assessment given in the fall, and Marta passed the benchmark, indicating that PAF program, with Cued Speech, was positively supporting her in this area. *Phoneme Segmentation Fluency* is the phonemic awareness measure administered in the winter and spring. The benchmark for the middle of kindergarten was 18 and she scored 28. The benchmark for the end of kindergarten was 35 and she scored 38. Her error pattern included not separating phonemes after the initial phoneme, for example 'jam' was separated /ʤ/ /æm/. She also dropped final consonants, such as in 'punch' she segmented the word, but dropped the final /ʧ/. The PAF program positively impacted Marta's acquisition of phoneme segmentation during her two years in kindergarten, despite Marta's limited language and phoneme confusion while speaking.

Nonsense Word Fluency. Marta was at "low-risk" for *Nonsense Word Fluency* at both the middle and end of kindergarten. She exceeded the benchmark in both the winter and spring, although her score improved by only one point from 27 to 28. She was able to say the sounds of

the words, but in the middle of kindergarten she was unable to blend the sounds or 'recode' the sounds into words. By the end of kindergarten, she was able to recode, or blend sounds of six words. Her improvement in this subtest demonstrated that Marta was generalizing phonemic awareness, the alphabetic principle, and fluency to words she had never seen or heard.

Word Use Fluency. Marta scored 0 at the beginning and middle of kindergarten for *Word Use Fluency*. In this context, *Word Use Fluency* refers to a student's ability to not only rapidly decode a word, but to comprehend the meaning of a word and its lexical properties, and then use it in a sentence. She was 'at risk' for *Word Use Fluency* for each benchmark, based on her performance compared to other students in the class. For the first benchmark, when presented with the word *happy* in print ('happy') she was unable to use it in a sentence. She incorrectly used the words *rained* and *ago*. For the second benchmark, when presented with words to use in a sentence, she repeated the phrase, "eat the____" and inserted each into her sentence. For example, when presented with the word *fence* in print 'fence', she said, "eat the fence." When presented with the printed word 'coach' she said, "eat the coach." She did this with each word presented during the one minute time limit. By the third benchmark, she scored a 15 and was able to correctly use four vocabulary words in four different sentences. For example, for the printed word 'doctor' she said, "Doctor is from hospital." For the printed word, 'ant' she said, "Ant has a black." When she did not know a word, she asked for its meaning. For the printed word 'felt' she said, "what does felt mean?" The PAF program positively contributed to Marta's reading comprehension in that she went from a score of 0 to being able to use various words in sentences and also being able to ask for their meaning.

Oral Reading Fluency and Retell Fluency. The DIBELS Oral Reading Fluency (DORF) subtest and Retell Fluency subtest are not reported because they are not administered during

kindergarten. In a phone conversation with DIBELS (Personal Communication, 2012), they advised that these measures are not appropriate to assess students 'at risk' in kindergarten.

To summarize, according to Marta's DIBELS scores, after a previous year of PAF instruction in kindergarten, she was not 'at-risk' in three areas of the *National Reading Panel (2000)*, including phonemic awareness, alphabetic principle or decoding, and fluency. Marta *was* 'at-risk' for her vocabulary and comprehension in the fall, based on the *Word Use Fluency* subtest, and she continued to be 'at-risk' in the winter and spring benchmarks, but she made significant gains in these skills with the *Preventing Academic Failure* program as a support. The DIBELS subtests disaggregated data regarding Marta's reading ability. Without information regarding Marta's *Word Use Fluency*, untrained observers might not see Marta's reading difficulty as her 'bottom-up' skills met the benchmark scores. Her comprehension and vocabulary, connected to what she had decoded, however, still needed targeted intervention. Another important factor is that while Marta met or exceeded the benchmark for three subtests in reading, her language skills were assessed by her school speech pathologist to be at a two to two and a half year old level and her language difficulties are evident in the syntactic errors when responding to items on the *Word Use Frequency* subtest cited above. To reiterate, despite only using hearing aids from age five and having limited language, limited audition, and difficulty with sound production, Marta's decoding, phonemic awareness, and alphabetic principle were found to be either age appropriate or above age-level expectations.

PAF-TSWR. In the fall benchmark on the PAF-TSWR, Marta was unable to decode words in any of the instrument's subtests. She was only able to say the first sound in each word of the first subtest. She guessed at the medial and final sounds, but was incorrect and there was no pattern to her errors. She was unable to attempt any subtest beyond the first set.

In the winter benchmark, Marta increased to a 45% for the first subtest, which required her to read consonant-vowel-consonant (CVC) words or pseudowords. She correctly read: 'lap', 'fed', 'had', 'log', 'wax', 'tub', 'yat', 'sut', and 'jep'. She was able to correctly read the beginning and ending sounds for all words in the subtest, but had difficulty with the medial vowel sounds. On the second subtest she scored a 10% on words with digraphs and blends. She correctly read: soft, and raft. She made a few attempts at other words such as: 'swing' /swɪŋ/→ */snoʊ/* ('snow'), 'self' /sɛlf/→/ɪf/ ('if '), 'fifth' /fɪfθ/→ /ɪf/ ('if'), 'branch' /brænʧ/→ /bɜ˞ʧ/ ('birch') , 'smest' /smɛst/ → /saɪnt/ ('saent'). She read a total of 5% of the words on the PAF test, which meant she already passed the benchmark by the winter.

In the spring, Marta scored a 65% on the first subtest of CVC words, a 15% on the subtest of digraphs and blends, and a 10% on the third subtest of one-syllable root words with suffixes. By the spring Marta attempted the third subtest and decoded two words including: 'buzzed', and 'swinging'. Her cumulative score was now an 8% out of a passing score of 2%. By the end of kindergarten, Marta had only been taught part of the lesson A book or up to lesson 27, but she had acquired and generalized some skills through level 129. Marta entered kindergarten with a severe hearing loss, having only just received hearing aids, and had a combined vocabulary of 75 words in English or Spanish. Despite severe delays, the PAF program supported her meeting benchmarks on all reading assessments, with the exception of the word use subtest of the DIBELs.

PAF-TSWR TABLE 3: Marta's Percent of Words Read Correctly by Subtest on the PAF-Test of Single Word Reading

Subtest	Fall	Winter	Spring
	11/2/2011	2/1/2012	5/30/2012
1. Short Vowels in CVC Words	0	45%	65%

2. Short Vowels with Digraphs and Blends	0	10%	15%
3. One Syllable Root Words with Suffixes	0	0	10%
4. Two Syllable Root Words	0	0	0
5. Silent E in One Syllable Words	0	0	0
6. Long Vowels in One Syllable Words	0	0	0
7. R-Controlled Vowels in One-Syllable Words	0	0	0
8. Long Vowel and R-Controlled Syllables	0	0	0
9. Special Syllable Endings	0	0	0
10. Silent Letters, Soft C, and Soft G	0	0	0
11. Vowel Teams	0	0	0
12. Multisyllable Root Words	0	0	0
Total Percent of Words Read Correctly			
13. Total Words Recognized	0	5%	6%
14. Total Words Decoded	0	0	2%
15. Total Percent of All Words Read Correctly	**0**	**5%**	**8%**
Benchmark = 2%			

DRA. Marta's teacher reported DRA scores in the winter and spring. No DRA score was reported for the fall because the test is only administered in kindergarten in the winter and spring, but she read a level 2 DRA story in the spring of her first year of kindergarten. Kindergarteners were given a letter assessment in the fall and Marta knew all of her uppercase and lower case letters this year, her second year of kindergarten. On the DRA, Marta read a level 3 DRA in the winter and then did not surpass a level 3 in the spring. She was able to decode both a level 4 and a level 6 in the spring, but did not meet the comprehension benchmark.

Marta passed the benchmark of 2 in the winter and met the benchmark of 3 in the spring. These scores are aligned with her scores from the other assessments such as *PAF-TSWR* and the *DIBELS.*

Marta's greatest area of difficulty was word use and vocabulary. Prior to reading the leveled passage, the teacher asks the student questions about their reading preferences and reading engagement. When asked to describe her favorite book, Marta was able to say 'Clifford', but needed support to respond to the question and to elaborate on why it was her favorite book. Marta did not monitor her oral reading and did not make self-corrections of her three miscues. She used cues from the story to help her decode the text such as the pictures and sentence patterns. Her accuracy was 93%. She had independent printed language concepts of directionality, such as reading left to right, one-to-one correspondence from decoding the words in the text, and phonological knowledge of beginning and ending sounds.

In the spring, Marta was able to decode both a level 3 and 4 text, but she struggled with her comprehension. She had no miscues, 100% accuracy for the level 4 text, and was close to the benchmark, but she was not able to make connections to other texts or to her own life. She was only able to retell with some language from the story, but needed prompts from the teacher. Her language delays impacted her ability to convey her understanding of the texts even though she was able to decode and read fluently without miscues. Her DRA score was comparable to her DIBELS score in that her areas of weakness were her vocabulary and comprehension.

Angela. Angela was diagnosed with a progressive, but mild hearing loss prior to entering kindergarten. She did not wear hearing aids until age five. Her IQ testing in 2009 identified her verbal IQ as a 70 and her performance IQ as an 82. At her special education meeting, prior to entering kindergarten, there was discussion about the possibility of additional learning or

attention difficulties, but because of her language and hearing delays, the school psychologist was not able to identify additional disabilities at the time of testing. Angela's mother reported receiving special education services, herself, when she was in school. Angela had received a year of hearing resource and Cued Speech instruction, from this researcher, prior to the testing year and PAF intervention.

Angela had daily reading instruction from a special education teacher that worked collaboratively with her classroom teacher. The special education teacher did not use the PAF program until the middle of the school year and instead used a variety of her own materials and self-made curriculum. The special education teacher felt that other approaches, that she was previously trained in, were more appropriate for her students, but after several months the district assigned a PAF consultant to work with the teacher and she began implementing the program in the winter and spring. Several conversations took place between this researcher and the special education teacher regarding the requirement that we implement the PAF program. She decided that this researcher should implement the program and she would continue with her own materials, until she was required by the district to change her approach. Angela received PAF twice a week from the beginning of the year from this researcher, in addition to auditory habilitation, and review and preview of academic content, and starting in the middle of the year Angela received PAF on a daily basis from her special education teacher.

Field Notes

***Fall PAF*.** As a kindergartener, Angela needed the whole year to learn the alphabet and initial sound and letter correspondence. Like Marta, she worked through Book A, although she was not retained, due to below average cognitive needs, and was in the first grade. She received instruction during two forty minute sessions with this researcher. Her special education teacher

did not begin the program until the late winter and Angela's progress was very slow, as a result. She only completed three lessons (17, 18, and 19) during the fall administration because the researcher did not proceed to a new skill until Angela had gained mastery of a lesson. Angela worked on putting the letters of the alphabet in the correct order. She learned the /æ/ sound, the sight words: 'a', 'I', 'is', and 'the' and practiced reading, writing, and rhyming words with the [at] spelling such as: *fat, sat, cat, bat, nat*. She made errors in her spelling by writing letters backwards, in the wrong order (*cat*—'cta'), based on her speech (*fat*—'fan', *hats*→'hat'), based on visual similarities (*had*→'hap'), and made non-phonological errors (*has*→'gurse'). Her comprehension was limited and her memory was inconsistent. Her working pace was slow and she had weak attention which meant it took several weeks to complete one lesson. For a comprehension activity, she had to match phrases to pictures. The phrase 'a mat', she read as 'a cat.' She misread 'a pat' as 'a pet' and needed support to clarify her understanding. Cues were used to clarify spoken English by the researcher and to clarify errors made by Angela. Angela imitated the cues, but there was limited contact time with the researcher and this impacted her ability to remember lessons from week to week. She struggled to identify all of the letters in the alphabet, to name words with initial consonant sounds that she had been taught, and to correctly code a phonemic lesson to the grapheme correctly. Angela's handwriting was illegible and her spelling inconsistent, which made it difficult to read back her own work.

Winter PAF. Angelina completed two PAF lessons in the winter. In level 20, she learned capital *D* and the difference between a comma and a period in a sentence. In level 21, she learned the sound and spelling pattern for /j/ and the sight word: *not*. Previous learning was reviewed and supported new skills. Angela had now mastered the alphabet, her sound-letter correspondence in isolation, sight words she had been taught, but still struggled when reading

short passages. Her comprehension improved for vocabulary in the program. For the word *tag*, when asked to say the meaning, she said, "outside you play the game tag" and "you have a tag on your shirt." She continued to write letters backwards, wrote words with letters out of order, and made errors based on guessing from the first letter, rather than decoding (*mad*→'mom', *man*→'mom').

***Spring PAF*.** Angela completed level 22 in the spring. Pacing issues were due to Angela's needs, and limited instructional days due to meetings, holidays, and school testing requirements. Angela had concurrently started working from the beginning of the program with her special education teacher on a daily basis. Angela continued to make spelling errors, but her errors were predominantly based on visual similarities (*bad*→'bab', *gab*→'gad') rather than based on her speech. She made few errors with letters out of order. Angela now understood the concept of rhyming and could say words from the program that rhymed (*cat, fat*), in addition to naming words that started with certain sounds (*bat, bad, bats*). Her dictations were usually correct for previously taught sight words (*is, on, the*) and letters (*m, s, f, t, d*). Angela now made more observations about things she noticed in the program. She commented about having magnets at home that stick on the refrigerator, just like the magnet letter tiles she used at school. She noticed punctuation and rhyming words in the short stories. Angela remembered the routines of the lesson such as skywriting and dictation and would tell the researcher what needed to happen next. Outside of the program, Angela was not yet generalizing to classroom literature, but within the program she was able to read the short stories, based on the skills she had been taught.

DIBELS. Angela's results on the DIBELS are reported in Table 4.

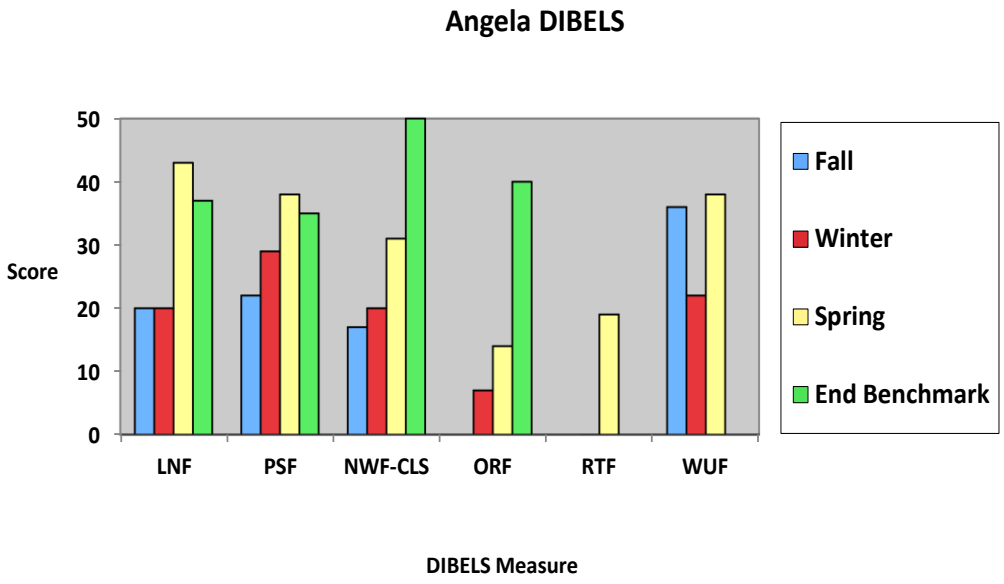
Table 4. Results on the subtests of the DIBELS for Angela during the fall, winter, and spring benchmarks.

Angela	**Fall Benchmark**		**Winter Benchmark**		**Spring Benchmark**	
Initial Sound Fluency	20/37		Not administered during this benchmark [1]		Not administered during this benchmark	
Letter Naming Fluency (LNF)	At risk.					
Phoneme Segmentation Fluency	22/35		29/35		38/35	
(PSF)	Some risk.		Emerging.		Established.	
Nonsense Word Fluency	CLS	WR	CLS	WR	CLS	WR
(NWF-CLS)	17/24	5	20/50	6	31/50	9
	Some risk.		Deficit.		Emerging.	
Oral Reading Fluency (ORF)[2]	Not administered during this benchmark		Correct	Errors	Correct	Errors
			7/20	6	14/40	8
			At risk.		At risk.	
Retell Fluency (RTF)	Not administered during this benchmark		0		19	
			At risk.		At risk.	
Word Use Fluency (optional)[3]	36		22		38	
	Benchmark=lowest 20-40% compared to peers are at-risk.		Benchmark=lowest 20-40% compared to peers are at-risk.		Benchmark=lowest 20-40% compared to peers are at-risk.	

[1]DIBELS does not administer these subtests during these benchmarks. *Letter naming* is not a strong indicator of being 'at risk' after the fall benchmark. Teachers can monitor their students' progress with supplementary materials. [2]*Oral Reading Fluency and Retell Fluency* are not given in the fall benchmark because the majority of children cannot yet decode and it does not accurately identify children 'at risk' during the fall benchmark (Personal Communication, DIBELS, October 31, 2012).

[2] "Preliminary evidence indicates that children's retell scores should typically be about 50% of their oral reading fluency score, and that it is unusual for children reading more than 40 words per minute to have a retell score 25% or less than their oral reading fluency score. A retell score of less than 25% of the oral reading fluency score may indicate a problem with comprehension" (Good & Kaminski, p. 6, 2002).

Figure 2. Comparative graphic representation of Angela's performance on DIBELS subtest across benchmark periods.



Letter Naming Fluency. In the first benchmark, Angela was 'at-risk' for letter naming fluency. She scored a 20, but the benchmark score was 37. She scored 54% of the benchmark. She had difficulty with 'l, s, and q'. Letter naming fluency is not administered again as part of benchmark data, but DIBELS allows teachers to progress monitor their students using supplementary lists. Using an alternative letter naming chart in the spring, Angela scored a 43 and met the fall benchmark score of 37. Her score improved to over 100% of the benchmark. She made one error, confusing lower case 'l' with lower case 'i', although this was not counted as incorrect, based on scoring guidelines.

Phoneme Segmentation Fluency. Angela's phoneme segmentation score went from a 22, to 29, and finally a 38 with a benchmark of 35 throughout the testing period. She scored 62% of

the benchmark in the first period, 83% in the second period, and achieved 100% of the benchmark in the third testing period. She had 'some-risk' in this skill in the first benchmark, was 'emerging' in the second benchmark, and met the benchmark in the third assessment period. In the first and second benchmarks, she made errors in consonant deletion and in segmenting final consonant clusters.

Nonsense Word Fluency. In the first benchmark, Angela correctly identified 17 letter sounds and recoded five words. She observed that the words were not real words. She confused the letters 'd' and 'b'. In the second benchmark, she had 20 correct letter-sounds with six words recoded correctly. She had difficulty with the /o/ vowel sound. In the third benchmark, she had 31 correct letter-sounds with nine words recoded. Her greatest difficulty was her speed at decoding, which prevented her from achieving a higher score.

Oral Reading Fluency. In the winter benchmark, which is the first benchmark for *Oral Reading Fluency* for first graders, Angela attempted one line of text from each of three passages. This subtest takes the median score from each of three passages as the student's benchmark score. Angela's median score was a seven, which identified her as 'at-risk' out of a possible score of 20 or above. She was unable to retell what she had read from any passage. She read basic sight words, skipping any words that she did not know. In the first passage, for example, she read the sight words: 'it', 'so', 'the', and, and correctly read the sight word 'blew'. In the second passage, she continued to read sight words and skipped words she did not know.

By the spring or second benchmark for *Oral Reading Fluency*, Angela read one word at a time and attempted to sound out words she did not know. Instead of one line of text, she now attempted two lines of text from each passage and was able to provide a brief retell for each passage. In the first passage, she misread 'street' (/strit/) as /stɪtʃ/ ('stitch') and 'dress' (/drɛs/ as

/dɪr/ (‘deers.’ She read ‘didn’t (/dɪnt/) as /doʊnt/ (‘don’t), which is a semantic miscue. In the second and third passage, she continued to skip words she did not know, but she attempted more words than during the winter benchmark. Her median score from the three new passages was now a 14. While Angela had doubled her score, the expectations for the test also increased to a benchmark of 40 or above. Overall, the PAF program supported Angela’s increase in *Oral Reading Fluency*, but it was not able to completely eliminate Angela’s difficulties in reading fluency.

Retell Fluency. Benchmark scores are not established, but it is recommended that students achieve 25% of their oral reading fluency score and meet the benchmark for oral reading fluency. In the winter, Angela was unable to retell any information from the three stories. She was only able to read a few sight words from one sentence of each story and was not able to derive any meaning from the few words that she read. Her median score was 0. While Angela did not meet the benchmark for oral reading fluency, she did achieve at least 25% of her score in the third benchmark. She was able to provide a summary from the two sentences of each passage, that she read. In the story, *The Sand Castle*, the first paragraph and Angela’s errors were as follows:

my an sing Fress
My ~~uncle~~, my dad, my brother, and ~~I built a giant sand castle~~ at the ~~beach~~. ~~First~~ we

-ing shop
pick~~ed~~ a ~~spot~~]~~far from the big waves. Then we got out buckets and shovels. We drew a line to show where it should be. It was going to be big!~~

Angela summarized, “The sand castle. The sand castle was sad. The sand castle is ruined. It was sad because it was ruined.” Angela understood that she read about a sand castle, but she did not understand the details in the story. Her use of the word *‘ruined*’ was notable for

the discrepancy between Angela's overall performance and understanding versus her correct word usage.

Word Use Fluency. In this DIBELS subtest, the evaluator presented words one at a time and students receive credit for using each word correctly in a sentence, and receive credit for the length of their sentences. In the first benchmark, Angela correctly used seven vocabulary words (*ever, plants, its, black, might, everything, happy*) in seven different sentences. In the second benchmark, she also attempted seven vocabulary words (*real, horse, funny, doing, face, dry,* '*store*'), but misused two of them (*real, horse*). For '*real*' (/ril/, she said, "I am reading /ridɪŋ/ a book." For *horse* she said, "I am busy." For the word *dry* she originally misused the word and said, "You *try*'(/traɪ/) your best" but realized her mistake and then said, "Dry (draɪ/) your clothes." Examples of correct sentences included, "Your face is funny." and "We going to the store." For the third benchmark, she attempted eight vocabulary words (*river, leave, friend, chair, anyone, trade, feet, and memories*). She had correct sentences such as, "You can't forget your memories" and "Anyone cannot carry stuff like me." She misused the word 'feet' and said, "Feed (/fid/) the baby."

PAF-TSWF. Angel's data on this test are reported in Table 5 below.

PAF TABLE 5: Angela's Percent of Words Read Correctly by Subtest of the PAF-Test of Single Word Reading

Subtest	Fall 11/2/2011	Winter 2/1/2012	Spring 5/30/2012
1. Short Vowels in CVC Words	0	0	35%
2. Short Vowels with Digraphs and Blends	0	0	40%
3. One Syllable Root Words with Suffixes	0	0	0
4. Two Syllable Root Words	0	0	0
5. Silent E in One Syllable Words	0	0	0
6. Long Vowels in One Syllable Words	0	0	0
7. R-Controlled Vowels in One-Syllable Words	0	0	0
8. Long Vowel and R-Controlled Syllables	0	0	0
9. Special Syllable Endings	0	0	0
10. Silent Letters, Soft C, and Soft G	0	0	0
11. Vowel Teams	0	0	0
12. Multisyllable Root Words	0	0	0
Total Percent of Words Read Correctly			
13. Total Words Recognized	0	0	1%
14. Total Words Decoded	0	0	5%
15. Total Percent of All Words Read Correctly	**0**	**0**	**6%**
Benchmark = 2%			

In the fall benchmark, Angela did not attempt to read any words from the PAF assessment. She said it was too hard. In the spring benchmark, Angela sounded out words from the first and second subtest, but she was not able to recognize any words and did not attempt to blend the sounds that she had read. For example, in the printed word 'lap' she pronounced: /l/ and then paused and pronounced /ae/ and then paused and pronounced /p/, but she was not able to identify 'lap.' The process of identifying the sounds was time consuming and Angela paused and needed support to stay on-task. After the second subtest, the test was discontinued because Angela continued to identify the sounds the letters made, without attempting to decode a word.

On the third benchmark, Angela recognized, decoded, or attempted to read the words from the first and second subtest. On the first subtest of *Short Vowels in CVC Words,* she immediately read the following printed words: 'lap' and 'win', and she decoded: 'had', 'zip', 'log', 'job', and 'vix'. She incorrectly read the other words without attempting to decode them. Her errors were primarily with vowel confusion. The printed word 'pot' (pɑt/) she read as /pʊt/ ('put'). The word 'gop' (/gɑp/) she read as /gæp/ ('gap'). She read 'dug' (/dʌg/) as /dɪg/ ('dig'). She incorrectly read 'fed' (/fɛd/) as /fʊt/ ('foot'). Her /t/ and /d/ confusion carried over among the different assessments, even with Cued Speech used as clarification during instruction. During instruction she was able to correct herself with teacher and Cued Speech support, but during testing, she was not able to self-monitor her errors.

On the second subtest of *Short Vowels with Digraphs and Blends,* she correctly recognized one printed word ('raft') and decoded seven words correctly ('song', 'soft', 'drank', 'tusk', 'twist', 'trunk', and 'fresh'). She incorrectly attempted seven words and did not attempt five nonsense or pseudowords. Her errors were vowel confusions or centralization ('swing' (/swɪŋ/) to /swʌŋ/ ('swung')), consonant cluster reductions and phoneme simplification ('fifth'

(/fɪfθ/) to /fɪft/ (‘fift’)), and confusions based on visual similarities or metathesis (‘blond’ (/blɑnd/ to /boʊlɑb (‘bolob’)).

DRA. During the course of the year, Angela increased her DRA score from a level two to a three, which is the benchmark score for the end of kindergarten and beginning of first grade. This means that at the end of first grade, she was one year behind her peers. The benchmark for the end of first grade is 16.

During the fall benchmark, Angela made no decoding or pronunciation errors. She was able to find words that began with certain letters. She had no miscues. In the winter, she scored a three with one miscue, when she read the word ‘said’ (/sɛd/) as /slaɪd/ (‘slide’). She used pictures in the story to help her decode the text.

In the spring, Angela was able to read a level four text, but she was not able to explain what she had read. She did not respond to the teacher when asked about her favorite book. Her teacher had to give her multiple prompts and the teacher re-administered a different version of a level three story. In the spring level three benchmark, Angela had one miscue which she self-corrected. When given the word ‘said’ she was able to say the beginning and ending sounds and name the letters in the word.

The DRA assumes that first graders will become decoders by the end of the year and has a strong comprehension component. Angela’s DRA score and her PAF score did not correlate in that the PAF score reflected what Angela was doing with what she was directly taught while the DRA score was based on what a ‘typical’ child should know at a particular grade level. In other words, on the PAF assessment, Angela demonstrated skills beyond what she had been directly taught in the program and so she passed the benchmark. On the DRA assessment, however, the

test evaluated students based on normed averages, and while Angela was able to make a year of reading progress based on the assessments, she maintained her year delay behind her peers.

Jacob. Jacob had a moderate to severe conductive hearing loss in his right ear, due to microtia atresia, an abnormality with his outer and middle ear and he had a mild, conductive loss in his left ear from fluid and wax that was not medically addressed. His hearing loss was untreated and he did not have amplification other than an FM soundfield system, used in the classroom. He did not attend school prior to kindergarten and he spoke only Spanish at home with his family. He received two years of instruction, three sessions per week from this researcher, prior to the testing year. Jacob was also enrolled in an inclusion classroom and had services from an inclusion special education teacher. During the testing year, Jacob received a 'double-dose' of the intervention because he received daily PAF instruction from the special education teacher, who co-taught in his classroom, and he received an additional three sessions from this researcher.

Field Notes.

***Fall PAF*.** Jacob worked through level A of PAF after the benchmark assessments. He worked on developing sight word vocabulary such as: *I, a, is, the, to* and the /æ/ phoneme as represented in words like *mad, sad, cat, dad*. Jacob practiced reading these sound patterns in words, phrases, sentences, and short reading passages. He then had to complete vocabulary and comprehension activities related to the lessons. In the fall, Jacob made frequent final consonant deletions in his speech ('bats'→/bæt_/, 'stab'→/stæ_/) and then again when he read words with these patterns. This confused his interpretation because he made mistakes related to tense and plurals. He confused his writing of letters such as 'b, d, p', and 'q' which made it difficult for him to read back his own writing. He also had difficulty remembering auditory information and

then writing it correctly. In one example, Jacob was asked to repeat the word *ram* before writing a dictation. Jacob repeated, /rɪm/ (rim) and then wrote, 'vam' and said the word was /væm/ (the 'r' and 'v' looked visually similar in his writing pattern). Jacob also had pronoun confusion, often making mistakes regarding whether characters in the story were boys or girls. He also had difficulty following his place in a story, had limited stamina, and had difficulty understanding story details due to limited vocabulary. Jacob had the ability, however, to ask for clarification. Jacob frequently says, "what's it called?" to fill-in for language he did not know. Despite these issues, Jacob was confident in his reading abilities with the PAF program. At the end of November he stated, "I want to do another one. (read a short story) I like reading."

Winter PAF. Jacob completed levels B *Dig In* and then also level C *Catch On* throughout the winter. The program is supposed to be implemented for at least an hour per day and Jacob was the only student who was provided the program for the full recommended duration. He was taught new medial vowel phoneme-grapheme combinations such as "the letter 'i' says /ɪ/" and the letter u says /ʌ/. Jacob's spelling improved through the use of multisensory instruction. Jacob, like all students in the PAF program, had to skywrite sound-letter combinations and words without typical spelling patterns. Jacob used this multisensory technique when he made a mistake and was corrected by the teacher. He would say, "Oh yeah!" and then practice writing it in the air.

Spring PAF. Jacob worked on book D in the spring. He could now generalize his decoding strategies to most classroom books outside the PAF program. He was able to concentrate on vocabulary and comprehension of literature and higher level material because he was not expending energy on bottom-up processes. The use of repeated vocabulary, throughout the program, while controlling for spelling and phoneme patterns supported Jacob's need to have

multiple exposures to terminology in order to decode it and use it for meaning. Jacob was quickly able to skywrite sound and letter combinations (m says /m/, x says /ks/) and he was able to correctly spell sight words that did not have regular spelling patterns (*the*, *said*). Jacob increased his stamina from a few words to reading stories and books of multiple pages. He developed his grammar and punctuation strategies and also improved his writing clarity. Jacob's fluency improved in that he could now read most of the words on the related spelling and dictation lists and in the short stories, although he was still pausing at unknown words and reading slowly. Despite his continued slow reading pace, Jacob now decoded fluently and had excellent expression.

DIBELS. Table 7 depicts Jacob's results on the DIBELS.

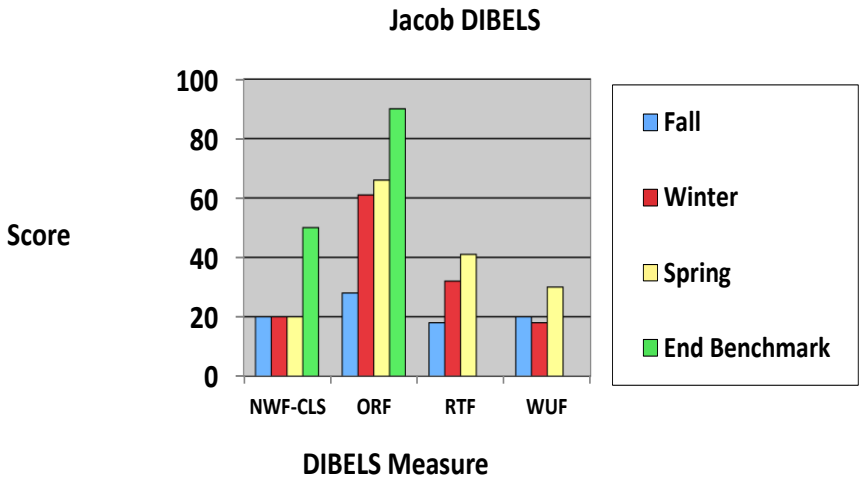
Table 7. Results on the subtests of the DIBELS for Jacob during the fall, winter, and spring benchmarks.

Jacob	**Fall Benchmark**	**Winter Benchmark**	**Spring Benchmark**
Initial Sound Fluency[1]			
Letter Naming Fluency			
Phoneme Segmentation Fluency			
Nonsense Word Fluency (NWF-CLS)	CLS 20 WR 1 Deficit.		
Oral Reading Fluency (ORF)[2]		Correct 61 Errors 15 Some risk.	Correct 66 Errors 4 At risk.
Retell Fluency (RTF)	18 At risk.	32 At risk.	41 At risk.
Word Use Fluency (optional)	20 Benchmark=lowest 20-40% compared to peers are at-risk.	18 Benchmark=lowest 20-40% compared to peers are at-risk.	30 Benchmark=lowest 20-40% compared to peers are at-risk.

[1] DIBELS does not administer these subtests during these benchmarks. *Nonsense Word Fluency* is not a strong indicator of being 'at risk' after the fall benchmark. Teachers can monitor their students' progress with supplementary materials. *Oral Reading Fluency* are not given in the fall benchmark because it does not accurately identify children 'at risk' during this period. (Personal Communication, DIBELS, October 31, 2012).

[2] Preliminary evidence indicates that children's retell scores should typically be about 50% of their oral reading fluency score, and that it is unusual for children reading more than 40 words per minute to have a retell score 25% or less than their oral reading fluency score. A retell score of less than 25% of the oral reading fluency score may indicate a problem with comprehension" (Good & Kaminski, p. 6, 2002).

Figure 3. Comparative graphic representation of Jacob's performance on DIBELS subtest across benchmark periods.



Initial Sound Fluency This subtest is only administered in kindergarten and first grade because it is no longer considered a measure of assessing students 'at risk' for reading difficulties.

Letter naming Fluency. This subtest is only administered in kindergarten and first grade because it is no longer considered a measure of assessing students 'at risk' for reading difficulties.

Phoneme Segmentation Fluency. This subtest is only administered in kindergarten and first grade because it is no longer considered a measure of assessing students 'at risk' for reading difficulties.

Nonsense Word Fluency. For the first benchmark assessment, Jacob scored a 20 for correct responses and the benchmark was 50. He achieved 40% of the benchmark score and was 'at-risk' in nonsense word fluency. Jacob decoded at a slow pace and while he read most of the sounds correctly, he only completed two rows. He skipped a line of text. With more time, he

may have received a higher score. He incorrectly pronounced the /o/ sound in the medial position of words. DIBELS does not reassess nonsense word fluency during second grade because it is not considered a good measure after the fall benchmark to assess student's that are 'at risk.' To address this discrepancy, but to adhere to the validity of the DIBELS testing, Jacob's nonsense word fluency was assessed each benchmark by the *PAF Test of Single Word Reading*, which will be discussed below.

Oral Reading Fluency. Jacob was, initially, at risk for oral reading fluency. For the first assessment, the benchmark is 44 and he scored a 19, which is 43% of the benchmark score. Jacob decoded at a slow pace and skipped two rows of text. He confused the suffix '–ed 'with the suffix '–s' and substituted the word *brave* (/breiv/) for the word *drive* ('drive'), a visual based miscue. For the second assessment, the benchmark was 68 and he scored a 61, now at the 89 percentile of the benchmark score. He was no longer 'at-risk' in oral reading fluency, but now had 'some risk' for oral reading fluency. His errors decreased by approximately 50%. For the third assessment, the benchmark was 90 and Jacob scored a 66 with only 4 errors, which is 73% of the benchmark. His difficulty was his reading rate and he is considered to be 'at-risk' for oral reading fluency, despite making gains in his overall reading fluency from a 19 to a 66 over the course of the year. Jacob closed his oral reading fluency gap from 43% to 73% of the benchmark.

Retell Fluency. Preliminary benchmark goals for retell fluency should be 25% of the oral reading fluency score while meeting the benchmark for oral reading fluency. Jacob's retell fluency met the benchmark for 25% of his oral reading fluency scores, although he does not meet the fluency benchmark. It was difficult for Jacob to retell, when he was only able to read a few sentences from each passage. For his first benchmark, he only read a line or two from each

passage and skipped lines, making it difficult to recall what he had read. For his second benchmark, Jacob made few decoding errors, but continued to skip lines. For his third benchmark, he made few decoding errors, but continued to read one word at a time. In one passage, he confused ‘grandma’ with ‘grandpa’ which could be considered a semantic miscue. He read ‘because’ as /bikəmz/ (‘becomes’) a visual configuration miscue.

Word Use Fluency. Tentative benchmark scores for word use are based on local school information for children in the lowest 20% of their school district for language and reading outcomes. Jacob was ‘at-risk’ based on comparisons to his school peers and by school data requiring him to have an Individualized Education Plan, although his score increased from 20 to 30, over the course of the year. Jacob used the words correctly, but his pace during the time limit impacted his score. The first benchmark, Jacob used three words in correct sentences with twenty words used in his total utterances. The second benchmark he used three words in correct sentences with eighteen words used in total utterances. The third benchmark he used five words in correct sentences with thirty total words.

PAF-TSWR. Jacob’s performance on the PAF-TSWR is reported in Table 7.

PAF TABLE 7: Jacob's Percent of Words Read Correctly by Subtest on the PAF-Test of Single Word Reading

Subtest	Fall 11/2/2011	Winter 2/9/2012	Spring 5/30/2012
1. Short Vowels in CVC Words	60%	65%	100%
2. Short Vowels with Digraphs and Blends	20%	60%	95%
3. One Syllable Root Words with Suffixes	0	60%	90%
4. Two Syllable Root Words	0	65%	85%
5. Silent E in One Syllable Words	0	45%	70%
6. Long Vowels in One Syllable Words	0	75%	95%
7. R-Controlled Vowels in One-Syllable Words	0	65%	70%
8. Long Vowel and R-Controlled Syllables	0	55%	75%
9. Special Syllable Endings	0	45%	80%
10. Silent Letters, Soft C, and Soft G	0	20%	60%
11. Vowel Teams	0	30%	60%
12. Multisyllable Root Words	0	35%	40%
Total Percent of Words Read Correctly			
13. Total Words Recognized	5%	42%	70%
14. Total Words Decoded	2%	10%	7%
15. Total of All Words Read Correctly	**7%**	**52%**	**77%**
Benchmark = 16%			

In the fall, Jacob read 7% of all words correctly; in the winter he read 52% of all words on the test; and, in the spring he read 77% of all words correctly. In the fall benchmark, Jacob only attempted words from the first two sections of the assessment. In the winter and spring, he attempted words from all 12 sub-sections. In the fall and winter, Jacob had error patterns based on visual similarities of letters such as b/d confusion and b/g confusion. He made errors based on his speech patterns such as d/t being pronounced the same: "had" (/hæd/)→/hæt/ ('hat'), and 's'/'z' being pronounced similarly: sut (/sʊt/)→ /zʊt/ ('zut'). Jacob made errors based on consonant cluster reduction, such as: 'swing' (/swɪŋ/)→ /wɪŋ/ ('wing'), and errors based on high frequency sounds that he could not hear such as: 'fish' (/fɪʃ/ → /fɪfθ/ ('fifth'). He had difficulty perceiving differences in vowel sounds and he frequently made vowel substitutions such as: 'fed' /fɛd→ /rɪd/ ('rid').

In the fall and winter, Jacob had difficulty with one syllable words that ended in a silent 'e' such as: 'zone' (/zon/→ /zun/ ('zun'), 'cube' (kjub)→ /kʌb/ ('cub'), and eve (/eiv/)→ /ɛv/ ('ev'). In the winter benchmark, Jacob had only received direct instruction through level 37 in book A "I Can". He only needed a 2% to meet the benchmark, but he read 52% of all words correctly on the assessment. In the fall and winter benchmark, Jacob attempted to decode only one or two words from each subtest and instead either read the word or made a rapid guess based on salient features of the word. In subtest 11, which had words with 'vowel-teams' ('ei', 'ea'), he changed 'weight' (/wait/) →/weit ('white'), 'meadow' (/mɛdoʊ/) → /mɪdoʊ/ ('mido'), 'ceiling' (/cilŋ/)→/kɛli/ ('kelly'), and harpoon (/hrpʊn/→ /hrbʊn/ ('harboon').

In the spring benchmark, Jacob read 77% of all words correctly. He had completed lessons through book C of the program, and was only expected to decode 8% of all words correctly. Jacob scored 100% on the first subtest and between 75% to 95% of all words

correctly, on subtests 2-10. He increased the number of words he decoded, or sounded-out, from 2% in the first benchmark to 17% in the spring benchmark. Jacob continued error patterns from the fall and winter benchmark, but the amount decreased from 93% incorrect in the fall, to 48% incorrect in the winter, and finally to only 23% incorrect in the spring. Jacob had some ongoing difficulty with stress patterns in words like: 'silent' (/seilnt/)→ /sɪlnt/ ('sIlent'). He had some difficulty with words ending in a silent 'e', like: 'zone' (/zoʊn/)→ /zon/ ('zon'), 'umpire' (/əmpeir/)→ /əmpɪr/ ('umpir'), and 'theme' (/θim/) →/ðɪm/ ('them'), which also indicates a voiceless to voiced substition. He made a consonant cluster reduction in the word: 'steam' (/stim/) →/tim/ ('team'). He also confused pronunciation of the /g/ in words like: 'gargle' (/grgəl/ → /jrgəl/ ('jargel') and 'garlic' (/grlɪk/)→ /jɛlɪk/ ('jellic').

DRA. Jacob's DRA score progressed from a 10 in the fall, to a 14 in the winter, and finally to an 18 in the spring. The final benchmark for second graders was 28. At the beginning of the year his score was equivalent to the middle of the first grade and at the end of second grade, his score had progressed to a second grade score, but he was still a year behind his peers. While he made a year of growth, according to the DRA, he maintained a year of delay behind his peers.

In the fall, Jacob had preposition and tense confusion, difficulty with phrasing and fluency, but had good comprehension, despite his errors. In the winter, Jacob continued to have tense and preposition errors, but again, these errors did not interfere with his understanding of the text. In the spring, Jacob made a few tense errors, but he had strong fluency. In the spring, Jacob's fluency increased again and he moved from the 'instructional' level to an 'independent' fluency level. This data corroborates the other assessments and reports from his teacher that the

PAF program positively impacted his decoding and subsequent fluency. Furthermore, this assessment supports that he had strong reading comprehension.

Diana. Diana had a severe bilateral hearing loss and additional learning disabilities. She did not consistently use hearing aids until kindergarten and did not receive treatment for her hearing loss until she was three. The school psychologist explained, in communication with this researcher, that Diana's difficulties were largely related to her lack of amplification and language exposure until kindergarten, which caused significant word learning and short-term memory challenges. She received daily hearing and English instruction for 80 minutes from this researcher for three years prior to initiation of this study. Diana received daily instruction for 80 minutes, from this researcher, during the testing year. By fifth grade, Diana had previously received PAF instruction, but she could only decode what she had been explicitly taught. While Diana had acquired basic decoding skills, she lacked the ability to read multisyllabic words, words with a silent 'e', and was unable to decode grade level text. Without explicit instruction in decoding rules such as syllable division and words with a silent 'e', Diana was unable to read words that followed these patterns. She was unable to generalize previously taught rules to new spelling patterns. She then devoted energy in an attempt to decode these words and did not focus on comprehending what she was reading.

Field Notes.

***Fall PAF*.** Diana worked through the same lessons and activities as John, but she was a motivated and focused learner. In the fall, she was unable to read words that had any of the new patterns. She was only able to generalize to classroom literature if she had been directly taught the rules in previous units. She was unable to read any literature within two years of her grade level partially due to the lack of instruction in the above language rules and her inability to

acquire these rules without direct instruction. She worked through levels 130 to 137 during the fall which included the silent *e* rule, contractions, and homonyms. Her initial errors were related to her speech patterns (deleted final consonants, -ed, -s, deleted articles, confused pronouns and prepositions, and spoke with limited lexicon and confused grammar). These errors translated into her recoding of text, her dictations, and created poor comprehension of the stories. One reading comprehension question asked, "*Will a shell trot?*" Diana read *'trot'* as /ʃrɔt/ (shrot) but did not know the meaning of *trot* either. With cues to clarify the spoken phonology and an explanation of the meaning, she was able to answer the question. Diana was able to generalize the instruction and remembered the lessons with repeated practice.

She used Cued Speech to prompt herself when she could not remember a sound, to review sound-letter correspondence, and for full clarification for spoken English from the researcher. Diana was interested in learning the system and she practiced expressively cueing words and sentences from her stories. Her cueing skills were excellent and she could receptively and expressively cue with clarity and accuracy.

Winter PAF. Diana made gains in the program, but sometimes over-applied her new rules (misreading 'slid' as 'slide') and continued to need support to read word endings, while thinking about how those endings impacted her understanding. She also needed support to understand new vocabulary and she was not able to use text clues for help. Her spelling improved significantly and she was able to correctly spell sight words that had been previously taught. Her grammar and vocabulary were still a significant hindrance to her comprehension of the more challenging texts.

Spring PAF. In the spring, Diana completed levels 142 to 145. There were frequent interruptions due to testing, meetings, and holidays that prevented PAF instruction. She was

taught the ai/ay patterns, reviewed the various spellings of the 'a' letter, and homonyms. Diana was now able to read and write words with patterns taught in the lessons. In a comparison of her dictations from the fall to the spring she had almost no errors in her spring dictations. She was able to generalize these lessons to her classroom literature. She still had difficulty with her comprehension based on her language delays and speech production, but she was able to read and write with more advanced skills based on the direct, multisensory instruction from the program.

DIBELS. Diana's performance on the subtests of the DIBELS is reported in Table 8.

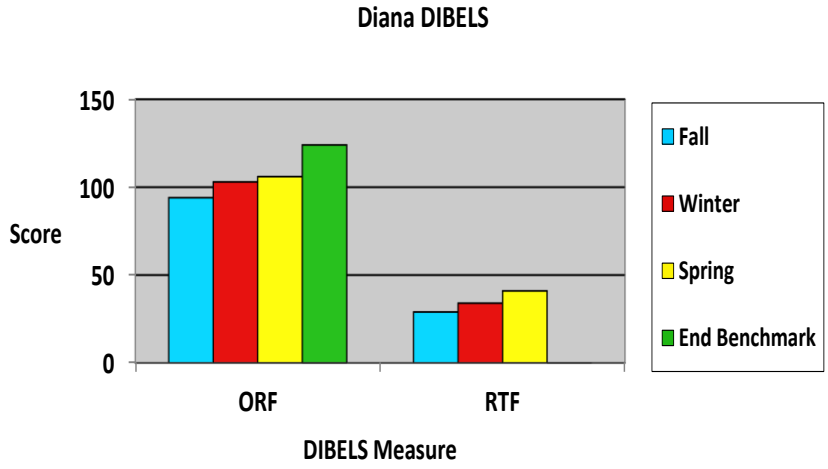
Table 8. Results on the subtests of the DIBELS for Diana

Diana [1]	Fall Benchmark	Winter Benchmark	Spring Benchmark
Oral Reading Fluency (ORF)	94 Some risk.	103 Some risk.	106 Some risk.
Retell Fluency (RTF)	29 At risk.[2]	34 At risk.	41 At risk.

[1] Initial Sound Fluency, Phoneme Segmentation Fluency, Letter Naming Fluency, Nonsense Word Fluency, and Word Use Fluency are not administered for fifth grade students. They are not considered valid measures of assessing students 'at risk' in this grade.

[2] "Preliminary evidence indicates that children's retell scores should typically be about 50% of their oral reading fluency score, and that it is unusual for children reading more than 40 words per minute to have a retell score 25% or less than their oral reading fluency score. A retell score of less than 25% of the oral reading fluency score may indicate a problem with comprehension" (Good & Kaminski, p. 6, 2002).

Figure 4. Comparative graphic representation of Diana's performance on DIBELS subtest across benchmarks



Oral Reading Fluency. Diana's overall oral reading fluency score improved from a 94 to 103 and finally to a 106, but she remained in the 'some risk' category due to the increasing benchmark scores. She remained 10% to 15% below the benchmark for each testing period. Diana's error pattern, at the first benchmark, included skipped words and changed words. In the first passage, she changed 'had' to 'has'. This may have been a pronunciation error or demonstrated her difficulty with using and understanding tense in her speech. Diana made a visual error when she changed 'suggested' (/səgɛstɛd/) to /ə gɛst/ ('a guessed'), although this may also have occurred in her speech. She was not able to decode the longer multisyllabic word and find it in her lexicon. She changed 'put' (/pʊt/) to /pʊl/ ('pull'). In the second passage, she consistently dropped all of her '–ed' endings, several functor words, and prepositions. The omitted words, while reading, were not typically present in Diana's speech patterns, indicating that the errors were phonological in nature. In the third passage, she made several functor substitutions, such as 'the' (/ðʌ/)to /ʌ/ ('a') and 'that'(/ðæt/) to /tu/ ('to'). She continued to

delete final ‘–ed ‘endings. She also changed words she did not know into visually similar words that she did know such as ‘core’ (/kor/) to /kəlɚ/ (‘color’).

During the second benchmark assessment, Diana either deleted or added articles and deleted final /z/ in words such as ‘city’s’ and ‘includes’. She pronounced the first letter in ‘central’ with a /k/ sound, an overgeneralization or misapplication of a phonic correspondence. She continued her error pattern with the second and third passage by adding and deleting prepositions and skipping words that she did not know such as ‘enthusiastically,’ ‘examine,’ and ‘livestock.’ In the third passage she deleted the final phonological representations of ‘-s’ and final ‘–ed’, again a form of phonological simplification.

At the third benchmark, Diana read with expression and made fewer errors overall, but continued to make errors based on her pattern of speech. She dropped the final phonological representation of‘–s’ in print words such as ‘claws’ and ‘drops’, continuing her error pattern. She changed words she did not know into words she did know, such as ‘unfortunately’ into /kəmfɚtəbli/ (‘comfortably’) possibly due to visual similarity in this case, and ‘ospreys’ /ɑspris/ into /strɛs/ (‘stress.’) In the third passage, she changed the word ‘conquered’ (/kankɚd/) into /okɚd/ (‘occurred), which could be a phonological error based upon the rhyme of the syllable. She did not attempt to decode the longer words, but made guesses based on visual features and words she knew.

Retell Fluency. Diana’s retell fluency increased from a 29 in the fall, to a 34 in the winter, and finally to a 41 in the spring. The retell fluency score is the median number received among three reading passages. The retell score is derived by counting the number of words used in the retell. In the fall benchmark, her retell scores were all similar. For example, she received

scores of 29, 31, and 28. Diana was able to retell the gist of the paragraphs that she read from the passages, but she excluded pertinent details.

In the fall benchmark, Diana read a passage called, *Something's Missing!* Diana was able to read the first two paragraphs in the passage about a girl named Missy, on a bus ride with her dad, to visit her aunt's farm and her cousin Ralph. Diana recalled,

> "That…um. The Martha wait. Martha trying to find a seat for her dad. What else? Um. Martha is excited to go somewhere. I don't know where. She gunna have fun with her dad."

Diana was not able to recall specific characters, where the characters were going, or events that took place on the bus. She confused the name of the main character and was not able to recall the main idea of the story.

In the winter benchmark, her scores were also in a similar range, she received 34, 40, and 34 on the three passages. In a passage called, *"Do You Mean Me?*, Diana was able to read the first paragraph in the story. In that paragraph, a student learns at her piano lesson that she is invited to attend the city symphony orchestra to watch her piano teacher Mrs. Hawkins' friend, Luis, play the violin in a music and dance production called 'The World Dances." Diana recalled,

> "That I forgot her name. There's a girl named Luis. She went a performance and she invited all her class to a party. The girl I forgot her name. She played piano lesson and…".

Diana continued to have difficulty with important details in the passage. She was able to recall that the main idea was about attending a performance, but she confused the characters and

their roles. Diana's difficulty with functors, prepositions, and tense may have impacted her recall because she was not sure which people were doing what in the story.

Interestingly, in the spring benchmark, Diana received a retell score of 59 on one subtest, although her median was a 41. In a passage called *Whale Song*, Diana read the first two paragraphs of the story. The story narrator tells about his cousin, Jackson, who is a marine biologist and studies whale sounds at their house. The story explains how whales have conversations that are like singing and how these songs sound. Diana explained,

> "Is about these whales are singing and they repeat words all the time and they live with a cousin's house. That's all. They're different kinds of music the whales can sing. 'Cause 'asero?' has different of music of the whales' kinds."

Diana understood more of this passage than passages from previous benchmarks. She may have had more background information about the vocabulary in the story such as the concept of whales, from studying science, and cousins, from her large extended family. She understood that whales make different kinds of music. She understood that a cousin was studying them at his home. In the final passage about Mount Everest, where Diana scored a 59, we learn various facts about climbing the mountain. Diana read the first paragraph of the story. She recalled,

> "It's about these people that are climbing from the top of Mt Everest. And they were scared because many people died at the top of the mountain. Like a hundred-from climbing to the top of the mountain. And that's why they're scared. They don't want to go to the top of the mountain. The mountain is very huge."

Diana, however, missed details from this paragraph about how many people climbed the mountain, about various expeditions, and about the scientist who it was named after, but she had

a better overall understanding of this passage than other passages she had read. She may have been interested in the real facts of the stories about the whales and mountain climbing than in fictional stories that did not relate to what she had experienced in her own life.

DIBELS does not have an average score for retell and considers this measure optional, but students are expected to have a retell of at least 50% of their oral reading fluency score to meet a personal benchmark. According to DIBELS, students have comprehension difficulties if their retell is below 25% of their fluency score. Diana was only slightly above the comprehension benchmark in the fall and winter, but 14% above the benchmark for comprehension in the spring. Diana scored 30% of her fall fluency score, 33% of her winter fluency score, and 39% of her spring fluency score. While she was still below the expected 50%, she increased her retell measure overall and was able to provide increased details in the final benchmark than in the previous fall and winter benchmarks.

PAF-TSWR. Diana's performance on the PAF-TSWR is depicted in Table 9.

TABLE 9. Diana's Percent of Words Read Correctly by Subtest of the PAF-Test of Single Word Reading

Subtest	Fall 10/31/2011	Winter 2/1/2012	Spring 5/31/2012
1. Short Vowels in CVC Words	80%	90%	100%
2. Short Vowels with Digraphs and Blends	80%	85%	90%
3. One Syllable Root Words with Suffixes	80%	90%	95%
4. Two Syllable Root Words	80%	85%	100%
5. Silent E in One Syllable Words	60%	70%	85%
6. Long Vowels in One Syllable Words	95%	100%	90%
7. R-Controlled Vowels in One-Syllable Words	65%	80%	85%

8. Long Vowel and R-Controlled Syllables	60%	80%	80%
9. Special Syllable Endings	65%	80%	85%
10. Silent Letters, Soft C, and Soft G	45%	65%	55%
11. Vowel Teams	45%	80%	80%
12. Multisyllable Root Words	45%	60%	80%
Total Percent of Words Read Correctly			
13. Total Words Recognized	65%	77%	79%
14. Total Words Decoded	2%	3%	6%
15. Total Percent of All Words Read Correctly	**67%**	**80%**	**85%**
Benchmark = 61%			

In the fall benchmark, Diana read 67% of all words correctly. In the winter benchmark, she read 80% of all words correctly. In the spring benchmark, she read 85% of all words correctly. Diana had technically met the benchmark of 61% in the first benchmark, but she had not been taught the material or lessons from her placement level of *Book F: Lift Off* which explicitly teaches the '*silent e rule'* where vowels make a long sound if there is an 'e' at the end of a word and then also teaches *vowel teams*, such as how 'ea' is pronounced in words like 'read', of which Diana only scored 45% on the subtest. These are skill areas that the student struggled with significantly and was inconsistent with while reading, writing, and speaking.

In the fall benchmark, Diana performed well in areas that were previously taught in subtests one to four. Most of her errors were related to her speech patterns. In the word '*wax*' she dropped the final's' and said /wæk/ instead of /wæks/. She added schwas such as /splɪndəd/ ('splendid') to /spəlɪndɪd/ ('spelendid') and 'buzzed' (/bəzd/) to /bəzəd/ ('buzz-ud') and inserted the sound equivalent of the letter 'l': ('bame' (/beɪm/ to /bleɪm/ ('blame'), 'fossil' (/fɑsɪl/) to /flɑsɪl/ ('flossil'), 'gargle' (/grgəl/) to /gligəl/ ('gliggle') . Diana had difficulties with stress

patterns in multisyllable words. She had incorrect stress and added schwas on words in subtests 6 through 12 (‘beneath’ (/bənið/) to /binið/ (‘beneth’), ‘delay (/dəleɪ/)’ to /deɪleɪ/ (‘dalay’), ‘glance’ (/glæns/) to /gəlæs/ (‘gulance’). In the last three subtests, she adds schwas (‘disguise’ (/dɪsgeɪz/) to /dɪsŋeɪəz/ ‘(disgyuz’), ‘bruise’ /bruz/ to /bəruz/ ‘(beruse’), ‘advantage’ (/ædvæntɪdʒ/) to /ædvænətɪdʒ/ (‘advanatage’), and made certain phonological confusions (, e.g, /n/ for /d/ in ‘numb’ to ‘dumb’, /v/ for /f/ in ‘relieve’ to ‘relief’, ‘/d/ to /s/ in ‘departure’ to ‘separture’), switched vowels of words that were similar in print (/æksɛpt/ (‘accept’) to /ɛksɛpt/ (‘expect’), and produced nonsense words from real words (‘possession’ (/poʊzɛʃən/) to /poʊzɛsəʃən/ (‘possesition’), ‘balcony’ (/bælkən/) to /bəloʊnsi/ (‘balonsee’), while still keeping correct syllable division (‘minimum’ (/mɪnəməm) to /mɪnɪfəm/ (‘minifum’).

Her scores were high until subtest 5, and then declined as the later subtests included material that was not explicitly taught. Interestingly, her score is strong in subtest 7, long vowels in one syllable words. She may have been familiar with the words on the test or the listeners may have been more comfortable with her speech patterns while listening to Diana read those words.

DRA. Diana began the year with a DRA score of 34, increased to a 38 in the winter, and increased to a 40 in the spring. In the fall, Diana had to read and respond to a story about a child’s house that was flooded by rain. Diana had six miscues, overall, including omissions, insertions, and substitutions that were visually similar. Her reading expression was at the independent level and was generally appropriate, meaning that she read with correct phrasing and attention to punctuation. She had some understanding of text features and comprehension. The teacher reported that several areas of instruction could support Diana including strategies for

reading stamina, creating reading routines, modeling phrasing, supporting characteristics of a reading summary, and teaching examples of inferences.

In the winter, Diana read a non-fiction story about Amelia Earhart. She had difficulty with some pronunciations. She pronounced exciting as 'exteresting.' She pronounced 'canary' as 'cantry.' She omitted two functors (and, to), and deleted one final consonant. She read with good expression. Like the story from the fall, she read primarily at the independent level meaning she had appropriate reading engagement, fluency, and comprehension, but her understanding was not at an advanced level.

In the final story in the spring, Diana read a level 40 which placed her at the end of the 4th grade, a year behind the benchmark. She made only three miscues, including two deleted prepositions and one deleted –ed. Her scores fell in either the instructional or independent level with an overall comprehension score of 14, which is just above the level that requires a lower level text. Diana's greatest area of need was in her comprehension, interpretation, reflection, and metacognitive awareness of the story.

Based on the DRA score, the PAF program supported Diana as she made a year and a half of progress in her reading within one year of instruction. Her fall benchmark of 34 is the average performance of third graders in the winter benchmark. Diana's exit score of 40 was the average score for exiting 4th graders.

John. John had a mild to moderate bilateral hearing loss and was in a self-contained classroom for students with learning and behavioral needs. He struggled with attention and compliance throughout the day. John resisted using his assistive technology, including hearing aids and FM system, but his resistance was generally applied to any teacher directive, and was not necessarily related to hearing needs. His behavior was challenging and constant

reinforcement and rewards needed to be implemented in order to maintain his focus and productivity. Progress was made throughout the year, but with tremendous effort from John's teachers and this researcher, supporting his various needs.

Field Notes.

***Fall PAF*.** John worked through levels 130 to 137 in Level F, *Lift Off*, of the program. There are 28 lessons that focus on the silent e rule across the five vowels (a-e=whale, o-e=bone, e-e=these, u-e=mule, i-e=kite), in addition to alphabetizing and dictionary skills, contractions (couldn't), homonyms (their, there; ea, ee), the concept of nouns and verbs, vowel teams (ai, ea, oa, ea), adverbs and suffixes (-y, -ly), multi-syllable words, and spelling patterns (-tch, ck). Like previous levels, *Lift Off*, has stories and comprehension activities that take all the previous lessons and build upon them so students are constantly reviewing previously learned skills and do not encounter sound, spelling patterns, or language activities that they have not been taught. John was expected to read and write sentences like: *We are sure they have only two trees in their whole garden*. The stories were now several pages in length with comprehension questions that asked about details, main idea, and story structure, rather than matching pictures to words and phrases.

John had difficulty focusing and complying with directions. Reward systems had to be implemented and constantly revised due to John's behavior. John also resisted wearing his hearing aids and this impacted instruction as he only received two sessions for forty minutes, but time was spent on assistive technology, redirection and behavior, rather than on literacy. John was unable to read words that had any of the spelling patterns in the unit. He needed frequent practice with the rule and often forgot the rule from week to week, even though he also received the program in his self-contained classroom. John rushed and read words based on their first

letter, without decoding, and this impacted his comprehension. John had vocabulary difficulties, but did not have pronunciation errors in his speech. He understood stories when he could properly decode and focus and he enjoyed working independently on the comprehension questions.

***Winter PAF*.** John completed levels 138-141 including: u-e, syllables with silent *e*, and the –ck spelling pattern. John needed constant practice with lessons and multisensory support from skywriting and cueing, but he was typically non-compliant and refused to use tools available to assist his learning. This impacted his progress and caused frustration for John, who did not want to make a mistake, but remained unable to control himself. Frequent rushing caused constant reading, writing, and comprehension errors. He often complained that he did not need help and that learning to read was boring. John was sometimes motivated by his reward system where he received tokens for each completed program component that he could use towards computer time or snacks. He liked crossing off each component of the lesson (phonemic awareness, skywriting, dictation, word lists, reader, comprehension workbook, etc) and monitoring his own progress.

***Spring PAF*.** In the spring, John worked through level 144 including ai, a-e, and ay spellings of the letter a. His hyperactivity and non-compliance continued throughout the year impacting his rate of progress, but he still met expected goals in the program and acquired the new English rules, despite the ongoing behavioral issues and need for reward systems. John was able to apply his skills to classroom literature and said he enjoyed reading Judy Moody and comic books, which he had been unable to read prior to the instruction.

DIBELS. John's scores on the DIBELS are depicted in Table 10

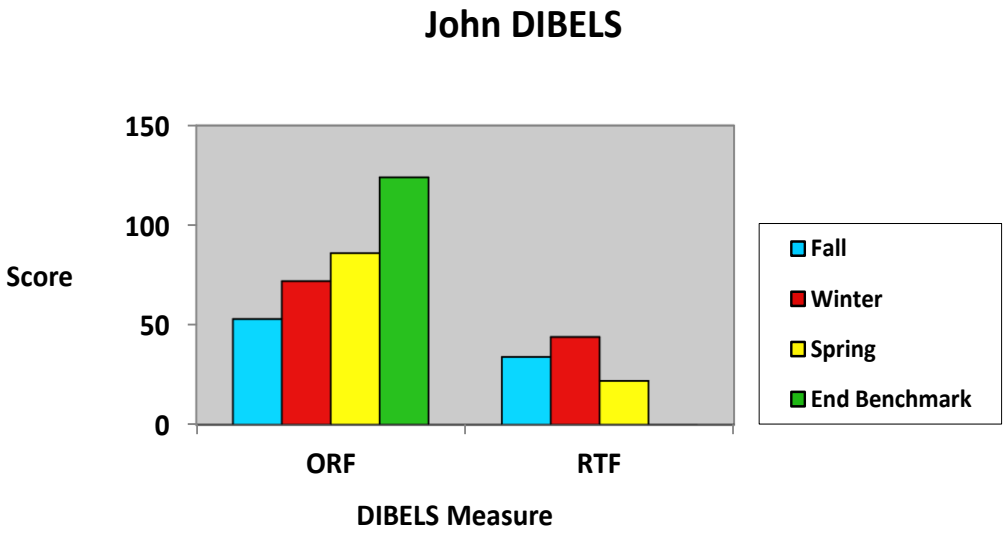
Table 10. Results on the subtests of the DIBELS for John.

John [1]	Fall Benchmark	Winter Benchmark	Spring Benchmark
Oral Reading Fluency (ORF)	53	72	86
	At risk.	At risk.	At risk.
Retell Fluency (RTF)	34	44	22
	At risk.[2]	At risk.	At risk.

[1] *The other five subtests are not administered to fifth graders because they are considered valid tools for assessing students 'at risk' in the fifth grade.*

[2] *"Preliminary evidence indicates that children's retell scores should typically be about 50% of their oral reading fluency score, and that it is unusual for children reading more than 40 words per minute to have a retell score 25% or less than their oral reading fluency score. A retell score of less than 25% of the oral reading fluency score may indicate a problem with comprehension"* (Good & Kaminski, 2002).

Figure 5. Comparative graphic representation of John's performance on DIBELS subtest across benchmark periods



Oral Reading Fluency. John's oral reading fluency increased from a score of 53, to a 72, to a final score of 86, although he continued to remain 'at-risk' because the final benchmark was

124. John was 50% percent behind the benchmark at the beginning of the year and was at 68% of the benchmark, by the end of the year. John struggled to pay attention to the task and was not compliant during the testing period. He was given a card, to help keep his place in the text, for example, but refused to use the card. During the first benchmark, he only read words he could immediately decode and skipped words he did not know. He read one word at a time, but also read as quickly as possible, missing important details. He skipped lines and also changed words based on the first letter that were unrelated to the story.

During the first benchmark, in a story about Mt. Rainier, he changed the printed word 'form' to /fa:m/ ('farm'), a visual configuration substitution. He dropped key words such as 'magma', 'melted,' and 'core.' At the second benchmark, his error pattern continued. He dropped full lines, skipped words he did not know, and changed words based visual similarities ('violin' (veɪəlɪn/) to /ɪnvɪnts/ ('invents'), 'symphony' (/sɪmfoni/) to /stʊdənt/ ('student'), but he made fewer mistakes overall. At the third benchmark, he again changed words he did not know into more familiar words based upon visual or possible initial phonological configurations and semantic miscues ('experiences (/kspɪrænsəz/' to /ɛkspres/ ('express') and 'guide dog' (/ged dɔg/) to /ga:d dɔg/ '(guard dog'), but he improved by only skipping a line in one story, instead of in all three stories. On one story he did not skip any lines and on another story, he skipped a line, but realized his mistake within the time limit.

Retell Fluency. John's retell fluency was inconsistent within both the same benchmark and across benchmarks. In the first benchmark, John was able to give a short, but accurate summary of the portion of text that he read from two stories. His retell score and his oral reading fluency score were similar for two stories. For example he scored a 55 on oral reading and 58 for retell for the first story and 37 oral reading and 34 for retell for the second story. The

DIBELS guidelines selects the median score for the oral reading fluency and retell, however, so in the final scoring there is a big discrepancy between the two scores, because on his last story his oral reading was 53, but his retell was a 26. He was non-compliant by the third story, possibly due to the demands of the task, and this impacted his overall performance. This student displayed task avoidance for most demands placed on him and needed tangible reinforcement to complete work. In the first story called "Something's Missing!" about a visit to a relative's farm, John read the first two paragraphs of the story in a minute,

> "~~Missy~~ *Mrs.* couldn't believe that the day she ~~had~~ been looking forward to ~~had~~ arrived at last.
>
> She and her father ~~were leaving on a bus~~ to visit ~~Aunt Martha's farm~~. Missy looked forward to seeing her aunt, but she was ~~especially~~ excited about seeing her favorite cousin, ~~Ralph~~.
>
> Although the bus was crowded, Missy and her father ~~found seats together~~ ~~near the front~~. Her father ~~suggested~~ that Missy ~~sit~~ next to the window, and ~~she eagerly scrambled~~ into ~~her~~ seat. ~~She put her backpack on the floor in front of her and began looking out the window.~~ Right below ~~her, workers…~~]"

His summary was,

> "Missy and her father were going to, to a trip…where Auntie is where her farm is and she was looking forward to do this and they went on, on a bus and Missy went on the bus with her dad and Missy was the one who sat by the window and that's all I can tell you."

John did not include the detail about Missy's cousin, but he was able to give the main details about the story. His main errors were skipping words and lines without attempting to decode

them. His pace also impacted his score as the benchmark expects a fifth grader to read more of the text.

For the third story of the first benchmark, about Mount Rainier, he read less than a third of the story,

> "~~Near the western~~ coast of ~~our~~ country ~~stands a stately~~ mountain called Mount ~~Rainier.~~ People below the mountain often watch-ed the mountain's ever-chang~~ing~~ed face as shadows and light pass over it. For~~How~~ever, many are not aware that ~~constant~~ is changes are are also taking place within the mountain.
>
> Mount Rainier ~~began~~ begin to ~~form~~ farm about ~~twelve~~ mil~~lion~~ years ago. At that time, ~~magma~~, or ~~melted~~ rocky, from the earth's ~~core~~ ~~began~~ begin…]"

He summarized,

> "They were going to a mountain…a lot of people watching the mountain…a lot of people liked that mountain. That's it. That's all I have." He left out salient details that he had read such as when the mountain formed, that the mountain went through changes."

PAF- TSWR. Table 11 depicts John's scores on the PAF-TSWR presented below

PAF TABLE 11: John's Percent of Words Read Correctly by Subtests of the PAF-TSWR

Subtest	Fall	Winter	Spring
	11/17/2011	2/3/2012	5/31/2012
1. Short Vowels in CVC Words	70%	95%	80%
2. Short Vowels with Digraphs and Blends	75%	90%	65%
3. One Syllable Root Words with Suffixes	45%	70%	60%
4. Two Syllable Root Words	50%	85%	80%
5. Silent E in One Syllable Words	50%	80%	75%

6. Long Vowels in One Syllable Words	40%	85%	70%
7. R-Controlled Vowels in One-Syllable Words	0	30%	75%
8. Long Vowel and R-Controlled Syllables	0	45%	65%
9. Special Syllable Endings	0	35%	50%
10. Silent Letters, Soft C, and Soft G	0	50%	50%
11. Vowel Teams	0	35%	50%
12. Multisyllable Root Words	0	20%	15%
Total Percent of Words Read Correctly			
13. Total Words Recognized	26%	53%	61%
14. Total Words Decoded	1%	7%	1%
15. Total Percent of All Words Read Correctly	**28%**	**60%**	**61%**
Benchmark = 61%			

In the fall benchmark, John read a total of 26% of the words and decoded one percent of the words correctly. His total percentage of all words read correctly was a 28%. He attempted words from the first six subtests and would not attempt any words from subtests seven through twelve. On the first and second subtest he read 70% and 75% of the words correctly. He made vowel confusion errors ('tab' (/tæb/) to /tʌb/ ('tub'), 'sut' (/sʌt/) to /sæt/ ('sat')). He frequently turned unfamiliar words into familiar words ('yat' (/jæt/) to/jɛs/ ('yes') and 'crand' /krænd/ to /kræn/ ('crane'). John attempted to speed through the assessment and needed repeated reminders to slow down. On the next few subtests, he rarely attempted to decode, but would make a guess based on the first few letters ('blinked' (/bleɪ nk/) to /bleɪ nkɪŋ/ ('blinking') and 'gallon' (/gælən/) to /gɑblɪnz/)'goblets'). John had difficulty with placing stress. The word 'buzzed' (/bəzd/) became /bəzɛd/ ('buzz-ed'). His accuracy on the first benchmark was impacted by his frustration

and fatigue with the task. His ability on the later subtests was unknown because of his refusal to continue with the testing. As a self-contained student, John's obstinate and inattentive behavior during testing was a typical representation of his behavior during the regular school day.

On the second benchmark, John received a 60% for percentage of total words read correctly. John was able to focus for the first six subtests and then lost his ability to focus for the last six subtests, but he did attempt the entire test. His score went up significantly during the winter benchmark. On the first subtest, John scored a 95%. The only word he misread was the nonsense word 'jep' (jɛb) which he read as /jɪp/'yip,' repeating the same decoding error, where he turned unfamiliar words into familiar words, from the fall benchmark. On the second subtest, he scored a 90%, but did not attempt to decode any words. He misread 'quilt' /kwɪlt/ as /kweɪɛt/) ('quiet') and the nonsense word 'smest' (/smɛst/) as /swɑpt/ ('swapped). On subtests three to six, his score ranged from a 70% to 85%. He attempted to decode several words ('helmet', 'splendid', 'fossil') and he decreased his vowel confusions. He still made errors based on grammatical morphemes ('spelled' to 'spelling') and ('blinked' to 'blinking'), but these also decreased. On subtests six to twelve, his errors ranged from 20% to 50%, but this was a large increase from the fall when he did not attempt the second half of the assessment. The program positively impacted John's stamina and attention allowing him to read more from the test.

On the third benchmark, John's score dipped slightly on the first six subtests. He was vocal about not wanting to take the test. At the time of the assessment, his classmates were involved in an activity on the computer and John did not want to miss computer time, although his teacher told him that he would be able to join the activity when he finished his assessment. John was highly active and inattentive during the assessment, but despite his behavior, he met the benchmark and his score increased to a 61%. Even more significant is that eight weeks

between the second and third benchmark were largely devoted to state testing preparations and there was a decrease in the amount of time given to PAF instruction. Despite John's behavior and lost instructional time due to testing, John made significant gains on several of the subtests including subtest seven: *R-Controlled Vowels (*30% to 75%), subtest eight: *Long Vowel and R-Controlled Syllables* (45% to 65%), and subtest nine: *Special Syllable Endings (*35% to 50%). He also increased in subtest eleven: *Vowel Teams* (35% to 50%). Instructionally, PAF lessons focused on lessons through subtest 5: *Silent E in One Syllable Words* and yet John's score increased in skill levels that he had not been directly taught.

***DRA*.** John's classroom teacher reported his DRA scores from the fall, winter, and spring. In the fall of fifth grade John scored a 24, which is equivalent to the winter benchmark in the second grade. In the winter, he scored a 28, which is equivalent to the spring of second grade or beginning of third grade. In the spring John scored a 30, which is equivalent to the middle of third grade. As a fifth grader, he started the school year approximately two and half years below grade level and at the end of the fifth grade, he maintained that gap, although he made a year of reading growth within one year of instruction. The teacher provided his DRA assessment from the winter and spring for analysis**.** The teacher could not find John's fall assessment although his score was saved electronically and was included in the data.

In the winter, John increased his overall fall score of 24 to an overall winter score of 28. His oral reading fluency was a 14/16. John had to read the DRA story *Energy From the Sun* about how solar energy is stored. The teacher took a running record of his expression and phrasing. John made 4 errors, or miscues, but he still received an advanced score for the level. He changed words he did not know into other words (electric power-electricity; hot to heat). He mispronounced 'cells' (/sɛls)/ as /tʃɛlz/ ('chells'). His words per minute, at 89.4 wpm, was at an

independent level, one level below an advanced score. His teacher gave him a score of ¾ for reading rate and score of ¾ for emphasizing key phrases and words. He received a 4/4 for using appropriate pauses, punctuation, and phrasing. He received a 4/4 for accuracy in decoding the text. His comprehension score was a 17/24 at an independent reading level. According to the teacher's DRA record, John asked thoughtful questions and made predictions about the story (4/4). He received a 2/4 for using features from the story to answer questions and for interpreting the story. He received a ¾ for summarizing the story in his own words with vocabulary and important ideas from the story, for correctly responding to comprehension questions about the story, and for reflecting on what he had read with a significant message and a relevant reason for his opinion.

John had to self-monitor and analyze his reading progress as part of the assessment. He answered questions about himself as a reader. He had to write three things to work on becoming a better reader. He wrote, '"stop at the periods and take a deep breath. stop going fast when you are reading and read slowly practice reading every day."' John had to write what he did well as a reader. He wrote, "I make pertictions before reading a book. stoping at the periods. Reading fullinly in class." John was also asked to describe what he planned to do to become a better reader. He wrote, "study reading everyday for 1 hour or 20 minutes I Sould not read quickly."

In the spring, John moved to a level 30. At this increased level his fluency was again a 14/16 and his comprehension was a 17/24. John read the DRA story *The Blasters*, which was selected by the teacher. He made only 1 error or miscue and was at an advanced level of accuracy or decoding, but his speed was a level below at a ¾. His word per minute score was an 81.1 which was a decline from the winter, but his accuracy increased at the slower speed. John observed in his self-analysis that he made errors when he read too quickly and this final

assessment demonstrated that when he slowed his pace, his accuracy increased. His only miscue was reading the word quietly as /kwɪkli/ 'quickly'. John increased both his fluency and comprehension as most of his scores were in the independent or advanced level (3/4). He was at the advanced level for *fluency* including phrasing and accuracy. John was at an independent level for expression and rate. For *comprehension*, he was at an independent level (3/4) for making predictions, summarizing in his own language, using information from the text for literacy comprehension, interpreting important details, and reflecting on the message from the story.

Field notes taken while working with John confirmed these results. John greatly increased his ability to decode text with the PAF program, but still struggled with his attention, behavior, and compliance to directions. It was difficult for John to focus for more than a few seconds at a time. He was constantly moving, out of his seat, and needed ongoing reinforcement to do his work. His attention and behavior were not directly addressed with the PAF program, and had to be addressed through teacher devised reward systems. Despite his behaviors and hearing needs, his improvement in phonemic awareness, phonics, fluency, vocabulary, and comprehension were still significantly improved despite his other learning needs. The sequencing, direct instruction, predictability, multisensory movements from the cueing and skywriting, and quick procedures of the PAF program were a direct benefit to John. He did not have the ability to be self-directed and needed the explicit program to increase his skills in all reading areas.

Classroom Teacher Interviews

Five teachers were interviewed, by this investigator, to identify how they viewed the reading performance of their students, as a result of the PAF program. Teachers were asked how

students were doing, in general, as readers, and how the program had any impact, if any, on the five areas of the National Reading Panel. Teachers were directly asked if they saw demonstrative growth in phonemic awareness, the alphabetic principle, vocabulary, comprehension, and fluency. Several themes emerged as a result of the interviews including consensus on growth in overall reading performance, alphabetic principle, and fluency, but differing opinions on the impact of phonemic awareness, vocabulary, and comprehension. Additional themes were a positive view of the PAF program design, its contribution to confidence building in the student readers, and the need for PAF to be used in conjunction with other approaches in the classroom. Only one teacher spoke negatively about the PAF program, and only in relation to the program's phonemic awareness instruction.

Demonstrative Growth in Overall Reading Performance. All five teachers expressed that they saw *demonstrative growth in overall reading performance*, during the course of the year, and directly attributed that improvement to the PAF program. A second grade teacher explained, "…I think it has had a positive effect because she knows what to expect. It's SO predictable. She knows what to expect. And she's mastered things and skills up to this point or she feels successful…and every new step is so small that she doesn't get anxious about the new material." This teacher elaborated that the program repetition contributed to the student's growth. Regarding what impacted the student's overall reading performance, she stated, "…I think the repeated, direct, the repeated practice about the sound-symbol correlation and the extra practice." Another teacher realized that her student who received the PAF program was performing above other students who no longer received the program. She explained,

> "I have other kids who've used it, but then stopped. She's above them. I didn't think about it before now…Other kids don't receive it anymore and their spelling is really, really low. D.'s writing is legible and it shows good understanding of the patterns…it has been very helpful. You can see with the program…how the program is helping

> her…You know, I didn't really think about it until just now…but, I think, you know now that I think about it…that's probably the reason why her spelling is above that of a lot of students that I have in my class…her writing…you can read it and she has a lot of good ideas and you can understand it."

The above teacher discussed how her student was above students who were no longer receiving the PAF program. Prior to the 2011-2012 school year, teachers were not required to use PAF. While the program was invented in the district by a White Plains teacher in the 1970s, a new curriculum administrator had come into the school district in the 1990s and moved the reading program to a holistic 'workshop' approach, where students learned through independent exploration, and teachers were told not to use the PAF program. Some teachers continued to provide PAF instruction discretely, however, and this teacher referred to those students and how her student was above those who received PAF in a limited manner.

Mixed Consensus on Demonstrative Growth in Phonemic Awareness. The interview subjects had different conclusions regarding demonstrative growth in phonemic awareness as a direct result from the program. Based on interviews, results were inconclusive regarding the PAF program and the impact of phonemic awareness on students overall literacy skills. Some teachers were confused between phonemic awareness and the alphabetic principle and needed clarification during the interview. Four teachers spoke positively about their student's phonemic awareness growth, with the program, while one interview subject believed that the PAF program was helpful overall, but that a different Orton-Gillingham program addressed phonological awareness and phonemic awareness more directly. She believed that for students with significant to profound phonological processing issues, they needed a more intensive phonemic awareness program and that the PAF program only addressed four of the areas of the National Reading Panel. The teacher explained,

"I think that the PAF program is weak in teaching phonemic processing and phonological…phonemic awareness and phonological processing because I see it as very much of a sight method. There's so much repetition. I've seen kids quickly memorize the word families and not develop their phonemic awareness. I'm worried that my kids who are getting PAF are not showing signs of improvement on the DIBELS…and I think that there are other methods such as LIPS that works on that very deeply. LIPS lacks the structured materials to use with a group in a classroom setting. PAF has that. It's very teacher friendly. It's very supportive for the teacher and it's very structured and it moves very slowly. For children who are struggling readers they get a lot of repetition *[with PAF]*, a lot of extra practice, in a nice structured program where expectations are minimal and clear, but I don't think it supports phonological processing. I think it's lacking."

This teacher believed that if the students were trained in phonemic awareness than the students would be prepared to meet the demands of the other areas of literacy. She continued,

> "…I also think there's acknowledgement, on some level that…when PAF doesn't work, you go to LIPS…because we've seen that here happen in the school. So she [the PAF consultant] may be very much in agreement that the phonological processing is addressed more intensively with LIPS than it is in PAF. I think PAF does assume some level of phonological processing and LIPS assumes none. And LIPS will get a kid ready for PAF. We've seen that happen."

Interestingly, this teacher's student was below the benchmark prior to the intervention and met the benchmark in the spring, following the PAF intervention. The student also approached the benchmark for Nonsense Word Fluency, which demonstrated the student was applying phoneme rules to reading nonsense words. While the teacher viewed this area of the program negatively, it still had a positive impact on the student.

Other teachers discussed difficulties with phonemic awareness, but did not attribute those difficulties directly to the program, but to the hearing difficulties of the students. One teacher

explained, "Not surprisingly, he did have some difficulty with pronunciations and a little bit of…a few missed cues." This teacher went on to clarify that these difficulties did not impact his decoding or comprehension. In spite of this student's hearing difficulties, the teacher said, "…his comprehension was very good, surprisingly so…I feel like the PAF definitely did help him with…giving him the tools he needed, the strategies with decoding, with the beginning, middle, and end sound. He was able to target the words that he didn't know." In other words, although teachers acknowledged their student's difficulties with phonemic awareness, four of the teachers saw progress as a direct result of the program. The dissenting teacher had a student who exceeded the benchmark following instruction.

Demonstrative Growth in the Alphabetic Principle. All five subjects believed that the program contributed to *demonstrative growth in the alphabetic principle,* phonological recoding, and sound-letter associations among their students and that this was a direct result of the PAF program. Facility with the alphabetic principle was the reading area spoken about most positively by the subjects. They observed growth in spelling, writing, sound-letter associations, phonological recoding, and as a result, improved reading fluency. All of the teachers agreed that the systematic approach of the program, with sound-letter associations being taught in a particular sequence contributed to their student's success with decoding. A teacher explained,

"I feel that he did make…considerably good progress. I feel like he would benefit, continue to benefit from it. Cuz it works for him. He understands the systematic approach…cuz it went from being…in the beginning…It was a progression. And it, it kept going…reviewing back…go forward…and going forward and so it was like a spiral. …so it was constant. Like so it was a reinforcement, but at the same time…while introducing the new phonological, you know

the phonics, or the phonograms, whatever you want to call them. Cuz I *do* see that it *does* work."

Demonstrative Growth in Reading Fluency. Interview subjects were asked if the PAF program had an impact on reading fluency. All five subjects saw *demonstrative growth in reading fluency* as a direct result of the program. This fluent reading was attributed to the repetition and scaffolding inherent in the PAF curriculum. A teacher, explained,

> "She does it [reads] automatically. Initially, that was the *hardest* thing for her. Like knowing that, you know, every letter makes that sound, and then transferring it. To like manipulate words and make words. Now she finds vowels, she finds *patterns* within words…I don't mean to sound repetitive, but because she's gained, um, strategies, on how to read, um, certain words, and gained vocabulary, and sight-word vocabulary…and being able to read, repeatedly, the same text. She's gained fluency, in that sense because she used to read very…words were in isolation…Now, she is able to just flow with it because she has more of a foundation…like a bank of words, so that she can retrieve them."

The program supported reading fluency because of the repetitive structure and sequencing in the lessons and texts. The teacher elaborated, "She re-reads the same books over, and hearing the same words over, over. That repetitiveness, definitely, um, helps her because she's more confident."

All of the teachers independently came to the same conclusion that the program design directly attributed to an increase in fluency. Teachers felt that the program was sequenced so that students were able to practice a sound first in isolation, then in a word, then a phrase, then a sentence, and finally in a short story. Students repeated the same rule for many lessons in a specific sequence. Fluency increased because students could, "sound out the words and then go back and re-read." This teacher continued, "Because of the fact…he was able to read the words quickly…and not be so choppy…they gave us the spelling list and how they build…phrases. So with the phrases, then that helps him to build fluency."

Demonstrative Growth in Comprehension. All five teachers reported that the program supported comprehension, but teachers varied in their analysis. One teacher was surprised with her student's strong ability to comprehend from working in the PAF program. She said, "his comprehension was very good…surprisingly so," but continued to explain that the basal readers, included in the program, were not dynamic stories and it seemed that a student would not make comprehension gains from these texts, controlled for English structure, rather than plot or story structure. Despite her thoughts about the story content, she continued,

> `"The only thing that I was surprised that…I know, um…cause I know PAF it's…the reading is boring. It's not…it doesn't have enough meat in it when it comes to comprehension. So I have to be honest with you, I was surprised that his comprehension was strong. And it *was* strong…because with the Merrill series books, it doesn't have as much meat as a trade book. It's very…what do you call it…prescribed…so it's like fat, cat, mat, man on the mat, you know. I'm thinking the simple base, but yes it's based on that. So you literally have to draw on…so it's not very…I feel like it doesn't engage the reader. "

Another teacher remarked about the degree of comprehension support, "I think her comprehension is also very weak. The program is supporting her comprehension. Not a lot, but it is supporting it on a very small scale." This teacher elaborated that the multisensory component of the program helped to support her student's comprehension. She explained, "I think the skywriting helps to reinforce in a child's memory the sound-symbol correlation, but it does not provide support for decoding an unknown word." In other words, the skywriting helped her student remember the sound-symbol relationships, although this teacher felt that it did not help with her student's decoding. The same teacher explained that all of her students struggled with below average intelligence and that limited time was an issue in addressing their cognitive and comprehension needs. She felt that the program, by itself, could not address her student's comprehension and that the student needed a self-contained classroom.

> "And the students that I work with now are needy in many, many areas of cognition and I can't address it, get through the PAF program, do some oral expression and

> comprehension that I need to do, and some spatial reasoning that I need to do…and still get to that. And I argue that these students would do better in a self-contained classroom for learning disabled kids…that they're not true inclusion students. If they were self-contained, I could get to it. I could integrate it into the flow of the school day and I can't do that because I have them for isolated periods of time and it takes so much time to get through the PAF lesson that I don't have time to get through any of those other supportive activities."
>
> "Well, aside from all the things we've already talked about her processing-her processing is very slow. And she is such a concrete thinker that I am concerned that…when she learns how to decode, it's gunna be very hard for her to make sense of what she reads because of the, of the, slowness in which she reads in, and her concrete thinking. And I think that she will get to the thinking, but it will take time. And I worry that in a classroom setting, she's not gunna be given the luxury of time that she needs to process it? And formulate it? And give it back to you."
>
> "She needs a lot of time for that. I also worry about her…affective functioning…and how that interferes with her learning…because she can go through periods where she's highly anxious, but she can't verbalize her anxiety. And it looks like, um, sensory. I really think it's anxiety and when she gets flooded with anxiety, like anyone would, she can't process."

Additional Themes. Several themes emerged that were not previously discussed when beginning the study. Additional themes that were contributed by the subjects included *demonstrative growth in confidence building*, as a direct result of the PAF structure and direct instruction, the *need for multiple approaches* when teaching reading, and praise for the *classroom-friendly program design* in the PAF reading materials.

Confidence Building. The five teachers each mention that the PAF program had a direct impact on the *confidence* of their students when approaching texts. A fifth grade teacher elaborated, "I don't know that she would've picked up on this without the PAF. I feel she's confident. She seems, you know, she's never hesitant to read out loud to me, like she's not singled out if we're reading something together as a class." The teachers commented on the predictability of the program and repetitiveness as contributing to the confidence of their students. Another teacher explained, "…That repetitiveness, definitely, helps her because she's

more confident…It's not overwhelming, and I think that's what's important. And so, I think, just by just gradually starting with certain themes, and making sure she masters them, before she starts to move on. That has helped her."

***Need for Multiple Literacy Approaches*.** Another theme that emerged was the need for *multiple approaches while providing literacy instruction*. While the teachers attributed PAF to overall reading ability and improvement in the five areas of the National Reading Panel, they believed that the PAF program, in combination with other methods, is what supported their students. They were not able to attribute growth to the PAF program exclusively, specifically in the areas of phonemic awareness, vocabulary, and comprehension. One teacher felt that while the program supported comprehension and vocabulary, her student made gains in comprehension and vocabulary from experiential learning in the classroom and that experience subsequently supported her understanding of the PAF basal readers.

> "Well, that has grown in terms of her experience…being able to experience things has helped her make connections to text…but I think that because she has experiences and we talk about things and she is exposed to different kinds of books and things like that. She is able to connect more…to the [PAF] text. I find that her comprehension has definitely improved."

This teacher believed that the combination of classroom strategies, including PAF, the workshop model, classroom experiences, and a variety of texts had made the difference in reading ability. She elaborated,

> "well, you know, to be honest, I think a combination of everything has really helped her because she has been exposed to all these different strategies…I'm not going to say that one is better than the other or one has helped her more. I think the combination of everything has truly helped her grow as a reader and just to understand what reading is. In the beginning, we think about when she came here two years ago. And you know, she came with *nothing* and barely be able to say her name. So now it's like she's above and beyond and so ready for first grade because she had all these different kinds of interventions."

***Teacher-Friendly Design*.** The teachers discussed the teacher-friendly design of the program allowing for ease of use in the classroom. This was not a question that was raised during the interviews, but each of the teachers independently discussed this as a benefit to implementation. One teacher explained, "PAF comes nicely packaged for a teacher in the classroom…the packaging is perfect…That was probably one of the selling points. And the research probably supports it as being classroom friendly and kids do make progress…" The teacher elaborated that other O-G programs were not as compatible with a large class, "…my beef with LIPS [alternative O-G program] is that it's, um, hard to implement in a group setting."

Given that there are various Orton-Gillingham based programs to choose from, and some teachers in the study had previously used other programs, PAF was extoled by the teachers for being easy to use. The program was explicit in every step of the curriculum with a teacher's guide, student workbooks, word lists, scaffolded mini-lessons, basal readers, and comprehension activities based on the reading. All of the teachers spoke positively about the repetitive, slow, and structured features of PAF.

Results Summary

The data from five methods of evaluation, including the DIBELS, DRA, PAF-TSWR, teacher interviews, and field notes positively supported that severely deaf and hard of hearing students can acquire early literacy skills as recommended by the *National Reading Panel* (2000). An Orton-Gillingham reading program, such as *Preventing Academic Failure*, while intended to support literacy acquisition in struggling hearing readers, was also successful at decreasing reading difficulties among deaf and hard of hearing students. The multisensory aspect of the program supported student's ability to remember language rules and the mediating tool of Cued Speech enabled the students to have availability to the English language, during *PAF* instruction,

despite their differing degrees of hearing loss and spoken language ability. Factors such as low socioeconomic status, learning disabilities, non-English speaking parents, age at amplification, and degree of hearing loss were not a hindrance in the reading progress of the five students included in the study.

All five students met or exceeded the benchmark scores on the *PAF Test of Single Word Reading* and they made demonstrative growth towards the benchmark on the district-wide *DIBELS* and *DRA* assessments. The five classroom teachers agreed that the program had a positive effect on their student's reading growth in each of the five areas recommended by the National Reading Panel. Field notes taken during program implementation supported the assessments and interview findings.

CHAPTER V.

DISCUSSION

The present study was designed to examine the literacy impact of the *Preventing Academic Failure* Orton-Gillingham methodology, supported with the mediating tool of Cued Speech, with five students who were deaf or hard of hearing. Student reading growth was analyzed based on the five literacy categories defined by the *National Reading Panel* (2000) including phonemic awareness, alphabetic principle, text accuracy and fluency, vocabulary, and comprehension. To answer the research questions, as to whether students would make demonstrative growth in each of the literacy categories, five methods of data were collected. The data included numerical information from the DIBELS, PAF, and DRA assessments, qualitative interview analysis from five classroom teachers, and field notes collected by the researcher throughout the duration of the study. Results showed that students demonstrated growth in each of the areas addressed by the research questions.

Research Questions

1. In one school year, will deaf and hard of hearing students demonstrate growth in phonemic awareness with an Orton-Gillingham approach?

   All five students demonstrated growth in their phonemic awareness based on their increase in DIBELS, DRA, PAF scores, field notes, and teacher observation.

2. In one school year, will deaf and hard of hearing students demonstrate growth in the alphabetic principle with an Orton-Gillingham approach?

   All five students demonstrated growth in their alphabetic principle and ability to decode text based on their increase in DIBELS, DRA, PAF scores, field notes, and teacher observation.

3. In one school year, will deaf and hard of hearing students demonstrate growth in text accuracy and fluency with an Orton-Gillingham approach?

   All five students demonstrated growth in their text accuracy and fluency based on their increase in DIBELS, DRA, PAF scores, field notes, and teacher observation.

4. In one school year, will deaf and hard of hearing students demonstrate growth in reading comprehension with an Orton-Gillingham approach?

   All five students demonstrated growth in reading comprehension during the time of the study based on their increase in the DIBELS, DRA, field notes, and teacher observation.

5. In one school year, will deaf and hard of hearing students demonstrate growth in vocabulary development with an Orton-Gillingham approach?

   All five students demonstrated growth in vocabulary development at the completion of the study based on their improvement on the DIBELS and DRA assessment and teacher observation.

Research Implications

Results from this study demonstrated that mainstreamed students, who are severely deaf or hard of hearing, can make a year or more of growth in their literacy achievement with an intensive Orton-Gillingham reading approach when supported with Cued Speech. This adequate yearly growth must be viewed in the context of the students' pre-existing needs. These students were not capable of making a year of growth in reading, without the intervention, based on their previous performance in school prior to the intervention. Complicating their hearing needs, all five students came from families of low socioeconomic status and four had non-English speaking parents. None of the students used hearing aids prior to starting school and all of the students came to the learning process with significant speech and language delays. Three of the students were formally diagnosed with additional learning disabilities while one of the students possibly

had additional learning needs, but it was unclear whether the learning needs were related to his impoverished language from his hearing loss or to some other reason. What this study clearly demonstrated was that despite the hearing challenges, poverty, non-English speaking parents, late amplification, learning disabilities, and behavioral challenges, these five students were still able to make the same amount of progress as their hearing peers who did not have any of these challenges.

This study now supports that appropriate, intensive intervention, created for students with reading disabilities and used with struggling hearing students (Shaywitz, 2003), can also support students who are deaf or hard of hearing and have additional challenges. Previous studies suggest that the average deaf student progresses only 1/3 of a grade per year compared to yearly progress of hearing students (Wolk & Allen, 1984). Other research shows that high achieving deaf students can make one year of progress with one year of instruction, but with several years of delay behind typical peers (Karchmer & Mitchell, 2003). In the current study, while none of the students eliminated their 1 to 2 year delays within the year of intervention, they all made at least a year or more of growth, neither regressing nor plateauing in their progress. Given the complicated backgrounds of the students in the study, this was an impressive achievement made by all five learners.

Limitations

Small Case Study

Due to the limited number of students available to this researcher and the diverse background of the subjects, there was no control group and a small N. The researcher could not compare how the students would achieve without any access to Cued Speech, with an alternative system to Cued Speech, or with an alternative Orton-Gillingham program. There may have been greater variation in student performance with an increase in subjects, but additional students

were not available, as is common with special education research (Crain, et al, 2006). Repeated qualitative case studies can provide additional support as to the ability to generalize this intervention to other students.

Teacher-as-Researcher

The potential for research bias cannot be entirely ruled out, as this researcher was also the students' teacher, prior to, and during the study. This teacher-researcher made numerous efforts, however, to address the potential for research bias through data triangulation and collecting, scoring, and analyzing data with assistants, to increase the reliability and verification of the study.

Limited Use of Cued Speech

Additional research is needed to compare the benefits of an OG program with, and without Cued Speech with deaf and hard of hearing students. This study does not address how students will perform without the additional support of a visual phonology when implemented with an Orton-Gillingham program, although numerous previous reading studies involving Cued Speech demonstrate that students who receive instruction with Cued Speech perform similarly to hearing peers without additional disabilities (Leybaert & Charlier, 1996; LaSasso, 2010). There may be ethical implications in not providing access to a cueing system because of the extensive amount of research already available. It is possible; however, that an Orton-Gillingham intervention is capable of mediating reading needs of deaf and hard of hearing students without the addition of Cued Speech, but this needs further study.

Another limitation of the Cued Speech support was the limited duration that students received it. The system was used to fully convey English during instruction from the researcher, but students did not receive the support at any other time. This amounted to only a half hour to

five hours of Cued Speech support per week, depending on the student. Previous studies demonstrate that deaf and hard of hearing students do best on literacy and academic tests when they receive Cued Speech both at home and at school (Leybaert & Charlier, 1996) throughout the day. Students in the present study were able to make considerable reading progress despite the limited cueing exposure, but it is possible that with greater availability they would have made more gains in their reading or alternatively similar gains suggesting that Cued Speech played a minor role in test score gains, owing most of the improvement to OG. None of the students, in the study, were profoundly deaf and future studies may need to make ethical considerations about the amount of cueing exposure needed based on the students access to English or other traditionally spoken languages.

Duration of access to cueing did not necessarily correspond to the amount of progress in the reading program. One student in the study received the cueing system for less duration than the other students due to less contact time with the researcher, and he made the most growth. However, the same student was also receiving treatment for a conductive hearing loss and had improvements in his hearing during the school year and thus relied ostensibly on audition rather than the visual component of cues. This same student also had typical hearing in one ear that fluctuated, so he may have just needed the intervention to address temporary gaps in his access to learning. This same student also received the intervention for a full eighty minutes daily from a special education resource teacher. He received the Orton-Gillingham approach more intensely than the other students, so as to which of these factors contributed most to his gains is unknown. There was another student who received Cued Speech less frequently, due to only seeing this researcher twice per week made the smallest amount of progress. This student had difficulty focusing, following directions, and refused to wear his hearing aids or make use of supports

available to him. This student was also in a self-contained classroom for students with additional learning disabilities and his slower rate of growth may be related to his learning disabilities and not to the amount of cueing received. If the student was able to increase his attention, wear his hearing aids, focus on learning, and improve his behavior he may have improved more, but the cueing was only one small part of his learning needs that complicated his performance. He also received the Orton-Gillingham program from his special education classroom, but the differences in growth are hard to compare because the students were in different programs, had different teachers, and received the method in different configurations. While the methodology proved overwhelmingly effective for the students in the study, multiple case studies with controls are needed to see whether the results can be replicated in other settings.

Tests Not Perfectly Aligned to Research Questions

The various tests used in the study were all tests required by the school district to monitor yearly literacy growth. These tests were not all perfectly aligned, however, with the five areas of the *National Reading Panel*, which supported the framework for analyzing student growth in this study. The DIBELS does not test each of the five areas every benchmark for every grade. Their policy, based on various phone calls throughout the testing period, is that testing each of the five areas for every grade does not provide an accurate measure of growth for most students. The majority of students master the alphabet in kindergarten, for example, so it is not reassessed after the beginning of first grade. Phonological awareness is assessed first for initial sounds, then for sound blending, and finally is analyzed as part of overall decoding and fluency, but not as a separate skill for every grade. The DRA analyzes fluency, comprehension, and vocabulary every benchmark for each grade, but phonology and decoding are assessed together by analyzing how many words a student can read and analyzing their miscues through direct analysis of their

errors. Where the DIBELS analyzes through counting decoding errors in a timed test and counting the length of response in a retell as the comprehension score, the DRA allows more room for teacher analysis. In the DRA, teachers have more control over the selected text and final score that students receive. The *Preventing Academic Failure Single Word Reading Test* assesses student growth in the program based on instructional categories, such as Vowel Teams or R-Controlled syllables. The test provides information about phonemic awareness, alphabetic principle, and fluency for single word reading, but does not analyze vocabulary or comprehension. All of these tests, in addition to teacher interviews and direct work with the students, needed to be analyzed in order to derive results for the five recommended categories. One test alone would not provide adequate data to support the *National Reading Panel* categories. All of these tests used together, however, provided triangulated data in that all students made progress in all of the tests. Their growth in the reading program was proven on each test and, thus, the weaknesses in each of the tests were diminished by looking at the accumulated data. While the current study analyzed the reading intervention and not the assessments, it may be difficult for schools to monitor these five categories without tests that are closely aligned to the recommendations from the *National Reading Panel* (2000).

Program Implemented Concurrently with Other Interventions

Students in the case studies did not receive the PAF Orton-Gillingham program in isolation. They also received reading instruction from their regular education teacher in a 'workshop' model that taught reading comprehension of big ideas, such as story elements and character studies. It is possible that this additional reading practice also contributed to students' overall growth. Students in the district, however, who are part of the workshop model, but do not receive Orton-Gillingham instruction, typically make very limited progress in their reading.

The reason for the district-wide PAF implementation was to address that students with disabilities were not making expected gains and the workshop model did not qualify as an evidence-based reading methodology. So while practice using this classroom method may have supported the students, it is unlikely considering they were all unable to make progress in the classroom and were thus assigned to the PAF intervention.

Suggestions for Future Research

Further research is needed to compare progress among students who receive different Orton-Gillingham programs, such as Wilson versus Preventing Academic Failure. While Shaywitz (2003) says that the curriculum can be flexible as long as it is Orton-Gillingham based, no studies could be found comparing different versions of Orton-Gillingham instruction. There may be different levels of progress with different programs. Research is also needed to compare Orton-Gillingham instruction to other special education reading programs, such as *Reading Mastery* or *Reading Milestones*, which are direct instruction programs with basal readers and teacher guides. These programs are not Orton-Gillingham based. Public and residential schools need to have information on what achievement to expect from students enrolled in these programs. Research is also needed on the impact of an Orton-Gillingham approach in residential and self-contained programs for deaf students who may have additional disabilities and use sign language as their primary method of communication because it known that individuals who are severely or profoundly deaf, even a number of whom come from deaf families that communicate by means of American Sign Language, decode print phonologically. Coincidently, these individuals have greater success in their reading abilities, performing better than deaf peers who do not (Hanson, 1989). Furthermore, it seems the case that the use of sign language affords no literacy advantage for those individuals who did not use a phonetic approach to decoding

(Hanson, 1998). The question that comes to mind is: "What would Orton-Gillingham implementation look like in a signing environment?"

A comparison study is needed to assess progress among students who receive an Orton-Gillingham program with, and without, Cued Speech. Given advancements in hearing technology, an Orton-Gillingham approach may provide mainstreamed deaf and hard of hearing students the tools they need to make adequate yearly progress, without the support of Cued Speech, given that an Orton-Gillingham program already has to include some kind of multisensory approach for phonemic encoding.

In conclusion, this case study demonstrated that mainstreamed students who are deaf or hard of hearing can make demonstrative growth in the five areas recommended by the National Reading Panel (2000). With an Orton-Gillingham reading program, mainstreamed deaf and hard of hearing students can make the same yearly progress as hearing students without disabilities, even if they have multiple other complicating factors such as low socioeconomic and ELL status, learning disabilities, delayed language access due to lack of amplification, and impoverished speech and language ability. Given the current climate of accountability and evidence-based practice, other public and residential schools should seriously consider the use of Orton-Gillingham reading instruction, supported with Cued Speech, with their deaf and hard of hearing students.

CHAPTER VI.

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VII. APPENDIXES

Appendix A

Classroom Teacher Interview Questions

Can you describe your student as a reader?

Can you describe what strategies your student uses while reading?

Describe your student's phonemic awareness in the classroom.

Describe your student's use of the alphabetic principle.

Describe your student's use of fluency and accuracy with text.

How is your student using vocabulary? Can you describe any changes that you've seen.

How is your student with text comprehension? Can you describe any changes that you've seen.

Appendix B

WHITE PLAINS PUBLIC SCHOOLS
OFFICE OF PUPIL SERVICES
EDUCATION HOUSE
FIVE HOMESIDE LANE
WHITE PLAINS, NEW YORK 10605
914-422-2034

JOANN DOHERTY
CO-DIRECTOR

SUSAN LECOINTE
CO-DIRECTOR

RE: IRB APPROVAL

To Whom It May Concern,

Jennifer Montgomery has permission from White Plains City School District to conduct her PhD dissertation research, in our school district, tentatively titled:

> A CASE STUDY OF THE ORTON-GILLINGHAM APPROACH AND CUED AMERICAN ENGLISH WITH 5 DEAF AND HARD OF HEARING STUDENTS:
> WHAT DYSLEXIA CAN TEACH THE FIELD OF DEAF EDUCATION.

She has permission to report results from our district special education reading curriculum (PAF) and assessments (DRA, DIBELS, PAF) over the course of the 2011-2012 school year, for her PhD dissertation. She may also report on results from recorded observations and running records, which are a regular part of teacher assessments in our district.

Ms. Montgomery has permission to interview classroom teachers, working with her 5 students, in both the winter and spring. She has submitted her dissertation proposal to me for review and discussed her research with the administration.

I understand that results from this study may be used at conferences, in journals, and for publication, but that all information will remain anonymous. I look forward to the results and her future research endeavors in the field of special education.

Sincerely,

JoAnn Doherty
Co-Director, Special Education

Appendix C

Teachers College, Columbia University
525 West 120th Street
New York NY 10027
212 678 3000
www.tc.edu

TEACHER INFORMED CONSENT

DESCRIPTION OF THE RESEARCH: You are invited to participate in a research study on the Orton Gillingham approach with deaf and hard of hearing children. Jennifer Montgomery will collect information on your student's reading growth, using the Preventing Academic Failure reading, writing, and spelling program. Your student will be learning how to read using Preventing Academic Failure, a program that all special education teachers are using with their students in the district. Your student's reading growth will be measured with district assessments including DIBELS, Developmental Reading Assessment, Preventing Academic Failure, and observation notes. The research will be conducted by Jennifer Montgomery, your child's teacher of the deaf, with help from her student teachers. The research will be conducted at your student's school as part of regular instruction. You will be asked to participate in an interview in the winter and spring to describe how your student is doing in the classroom with their reading development. The interview will be audiotaped and transcribed, but the tape will be destroyed upon completion of the study. Results from the study may be reported at scientific meetings, conferences, educational courses, and in journals.

RISKS AND BENEFITS: The reading program and assessments are required by the school district. The research has the same amount of risk students will encounter during a usual classroom activity. Benefits of this study including providing information to other teachers of the deaf in the impact of teaching literacy skills with an Orton-Gillingham approach. This program is part of the school day and your student will participate in Preventing Academic Failure (PAF) whether or not the information is reported for Jennifer Montgomery's research study. Your participation is voluntary and you may withdraw from the study at any time.

DATA STORAGE TO PROTECT CONFIDENTIALITY: Data will be kept in a locked cabinet and you will not be identified by name in the study. You will be referred to by a pseudonym.

TIME INVOLVEMENT: Your participation will take approximately 15 minutes in the winter and 15 minutes in the spring.

HOW WILL RESULTS BE USED: The results of the study will be used for my PhD dissertation, conferences, meetings, and may be made available for educational journals.

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PARENT INFORMED CONSENT

DESCRIPTION OF THE RESEARCH: Your child is invited to participate in a research study on helping deaf children learn to read. Jennifer Montgomery will collect information on your child's reading growth, using the Preventing Academic Failure (PAF) reading, writing, and spelling program. Your child will be learning how to read using Preventing Academic Failure (PAF), a program that all special education teachers are using with their students in the district. Your child's reading growth will be measured with district assessments including DIBELS, Developmental Reading Assessment (DRA), Preventing Academic Failure (PAF), and observation notes. The research will be conducted by Jennifer Montgomery, your child's teacher, with help from her student teachers. The research will be conducted at your child's school as part of regular instruction.

RISKS AND BENEFITS: The reading program and assessments are required by the school district. The research has the same amount of risk students will encounter during a usual classroom activity. By studying how your child progresses with Preventing Academic Failure (PAF), we hope to be able to help other teachers of deaf children in helping them learn to read. This program is part of the school day and your child will participate, in the reading program, whether or not the information is reported for Jennifer Montgomery's research study. Coercion and bias will be reduced because participation in the study is voluntary and you may remove your child from the study at any time. Your child's participation, or non-participation, in my study will in no way affect his/her grades or class standing. There are no direct benefits to participants of my study. General benefits may include information to future teachers about using an Orton-Gillingham program with deaf students.

DATA STORAGE TO PROTECT CONFIDENTIALITY: Data will be kept in a locked cabinet and your child will not be identified by name in the study. The study will be confidential. Your child will only be referred to by pseudonym.

TIME INVOLVEMENT: The child's participation in Preventing Academic Failure (PAF) will be throughout the 2011-2012 school year during hearing education services. The estimated time is 20 minutes, per session, with the teacher.

HOW WILL RESULTS BE USED: The results of the study will be used for my PhD dissertation, conferences, meetings, and may be made available for educational journals.

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CONSENTIMIENTO INFORMADO

DESCRIPCIÓN DE LA INVESTIGACIÓN: Su niño(a) _____ es invitado(a) a participar en un estudio de investigación sobre como ayudar a los niños sordos a aprender a leer. Jennifer Montgomery recopilará información sobre el crecimiento de lectura de su hijo(a), mediante el programa de ortografía, escritura y lectura de Preventing Academic Failure. Su hijo(a) va a aprender a leer con Preventing Academic Failure, un programa que todos los maestros de educación especial están utilizando con sus estudiantes en el distrito. El crecimiento de lectura de su hijo(a) se medirá con las evaluaciones del distrito, incluyendo DIBELS, Developmental Reading Assessment, Preventing Academic Failure y notas de observación. La investigación será realizada por Jennifer Montgomery, maestra de su hijo(a), con la ayuda de sus estudiantes de magisterio. La investigación se realizará en la escuela de su hijo(a) como parte de la instrucción regular.

RIESGOS Y BENEFICIOS: El programa de lectura y las evaluaciones son requeridas por el distrito escolar. La investigación tiene la misma cantidad de riesgo que enfrentarán los alumnos durante una actividad de aula habitual. Al estudiar cómo su hijo(a) avanza con Preventing Academic Failure, esperamos poder ayudar a otros maestros de niños sordos en ayudarles a aprender a leer. Este programa es parte de la jornada escolar y su hijo(a) participará independientemente de la información ser o no reportada para el estudio de Jennifer Montgomery. Coacción y sesgo se reducirá debido a la participación en el estudio es voluntaria y puede quitar a su hijo desde el estudio en cualquier momento. La participación de su hijo, o participación, en mi estudio en ninguna manera afectará su pie de clase o grados. No hay ningún beneficio directo a los participantes de mi estudio. Beneficios generales pueden incluir información para futuros maestros sobre el uso de un programa de Orton-Gillingham con alumnos sordos.

ALMACENAMIENTO DE DATOS PARA PROTEGER LA CONFIDENCIALIDAD: Los datos se conservarán en un armario trancado y su hijo(a) no será identificado(a) por su nombre en el estudio. El estudio será anónimo. Su hijo sólo se remitirá por seudónimo.

TIEMPO DE PARTICIPACIÓN: La participación del niño(a) será en el transcurso del año escolar, durante los servicios de educación auditiva. El tiempo estimado es de 20 minutos, por sesión, con el maestro.

CÓMO SE UTILIZARÁN LOS RESULTADOS: Los resultados del estudio se utilizarán para mi tesis de Doctorado, conferencias, reuniones, y podrán ponerse a disposición para revistas educativas.

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PARTICIPANT'S RIGHTS

Principal Investigator: Jennifer Montgomery

Research Title: A CASE STUDY OF THE PREVENTING ACADEMIC FAILURE ORTON-GILLINGHAM APPROACH WITH 5 DEAF AND HARD OF HEARING STUDENTS

- I have read and discussed the Research Description with the researcher. I have had the opportunity to ask questions about the purposes and procedures regarding this study.
- My child's participation in research is voluntary. I may refuse to participate or withdraw from participation at any time without jeopardy to future medical care, employment, student status or other entitlements.
- The researcher may withdraw my child from the research at his/her professional discretion.
- If, during the course of the study, significant new information that has been developed becomes available which may relate to my willingness to continue to participate, the investigator will provide this information to me.
- Any information derived from the research project that personally identifies me will not be voluntarily released or disclosed without my separate consent, except as specifically required by law.
- If at any time I have any questions regarding the research or my participation, I can contact the investigator, who will answer my questions. The investigator's phone number is (301)325-0746.
- If at any time I have comments, or concerns regarding the conduct of the research or questions about my rights as a research subject, I should contact the Teachers College, Columbia University Institutional Review Board /IRB. The phone number for the IRB is (212) 678-4105. Or, I can write to the IRB at Teachers College, Columbia University, 525 W. 120th Street, New York, NY, 10027, Box 151.
- I should receive a copy of the Research Description and this Participant's Rights document.
- Written materials ( ) may be viewed in an educational setting outside the research

  ( ) may NOT be viewed in an educational setting outside the research.

- My signature means that I agree to my child's participation in this study.

Guardian's Signature/consent: _____ Date:____/____/____

Name: _____

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DERECHOS DEL PARTICIPANTE

Investigador Principal: Jennifer Montgomery

Título de la investigación: UN ESTUDIO DE CASO DEL ENFOQUE DE ORTON-GUILLINGHAM CON 5 ESTUDIANTES SORDOS Y DUROS DE OÍDO

- He leído y examinado la Descripción de la Investigación con el investigador. He tenido la oportunidad de hacer preguntas acerca de los propósitos y procedimientos en relación con este estudio.
- La participación de mi hijo(a) en la investigación es voluntaria. Puedo negarme a participar o retirarme de la participación en cualquier momento y sin peligro para la futura atención médica, empleo, estado de estudiante o otras prestaciones.
- El investigador podrá retirar a mi hijo(a) de la investigación a su discreción profesional.
- Si, durante el transcurso del estudio, hay información nueva importante que ha sido desarrollada y esté disponible que puede referirse a mi disposición a seguir participando, el investigador me proporcionará esta información.
- Cualquier información derivada del proyecto de investigación que me identifique personalmente no será voluntariamente publicada o divulgada sin mi consentimiento separado, salvo que se exija expresamente por la ley.
- Si en cualquier momento tengo dudas con respecto a la investigación o a mi participación, puedo contactar el investigador, que reexpondrá a mis preguntas. El número de teléfono del investigador es (301) 325-0746.
- Si en cualquier momento tengo comentarios o preocupaciones en cuanto a la realización de la investigación, o preguntas acerca de mis derechos como un sujeto de investigación, deberé contactar con el Colegio de Profesores, Junta de Revisión Institucional de la Universidad de Columbia/IRB . El número de teléfono de la IRB es (212) 678-4105. O bien, puedo escribir a la IRB en Colegio de Profesores, Universidad de Columbia, 525 Oeste, calle 120, Nueva York, NY, 10027, casilla 151.
- Debería recibir una copia de la Descripción de la Investigación y del documento de los Derechos del Participante.
- Materiales escritos ( ) pueden ser vistos en un entorno educativo fuera de la investigación.
  ( ) NO PUEDEN verse en un entorno educativo fuera de la investigación.
- Mi firma significa que estoy de acuerdo con la participación de mi hijo(a) en este estudio.

Firma/consentimiento del Tutor: _____ Fecha:____/____/____

Nombre: _____

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Assent Form for Minors (8-17 years-old)

I _____ (child's name) agree to participate in the study entitled: A CASE STUDY OF THE ORTON-GILLINGHAM APPROACH WITH 5 DEAF AND HARD OF HEARING STUDENTS.

The purpose and nature of the study has been fully explained to me by Jennifer Montgomery (investigator's name). I understand what is being asked of me, and should I have any questions, I know that I can contact Jennifer Montgomery (investigator) at any time. I also understand that I can quit the study any time I want to.

"In my college, I am learning how to teach deaf children to read. I want to show how much you know about reading to my college. Can I show your PAF reading work to my college teachers?"

Name of Participant: _____

Signature of Participant: _____

Witness: _____

Date: _____

Investigator's Verification of Explanation

I certify that I have carefully explained the purpose and nature of this research to _____ (participant's name) in age-appropriate language. He/She has had the opportunity to discuss it with me in detail. I have answered all his/her questions and he/she provided the affirmative agreement (i.e. assent) to participate in this research.

Investigator's Signature: _____

Date: _____

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Consentimiento forma para Menores (8-17 años-edad)

Yo _____(nombre del niño) acepta participar en el estudio titulado: A CASE STUDY DE LA ORTON-GILLINGHAM ENFOQUE CON 5 Y DURO DE AUDIENCEA SORDOS.
El propósito y la naturaleza del estudio ha sido explicado totalmente a mi por Jennifer Montgomery (nombre del investigador). Entiendo lo que se pide de mi y tengo dudas, sé que puedo contactar Jennifer Montgomery (investigador) en cualquier momento. También entiendo que puedo salir del estudio cualquier momento que desee.

"En mi colegio, estoy aprendiendo cómo enseñar a los niños sordos a leer. Quiero mostrar cuánto saben sobre la lectura a mi colegio. Puedo mostrar tu PAF lectura trabajo a Mis profesores del Colegio?"

Nombre del participante:
Firma del participante:
Testigo:
Fecha:

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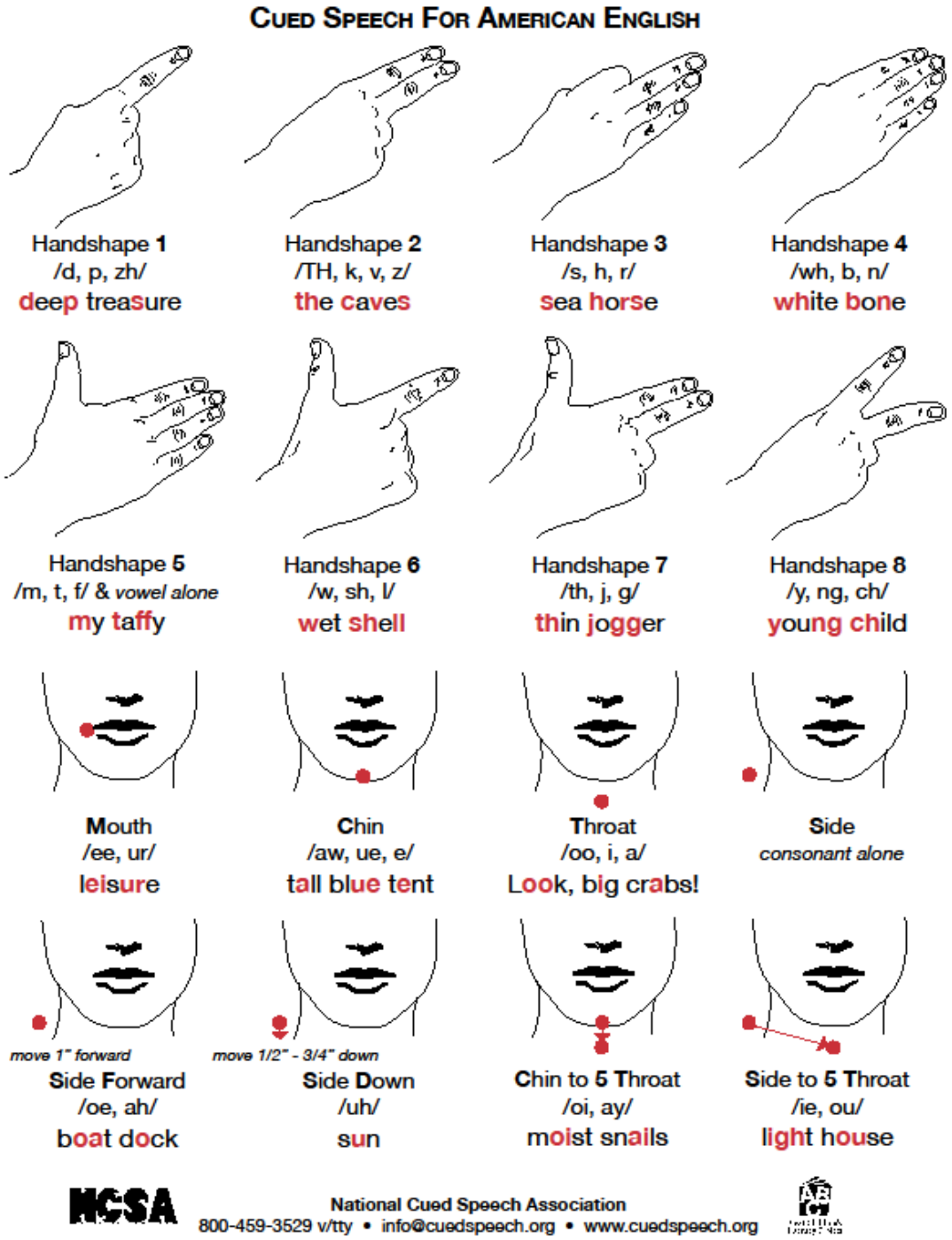
Appendix D


CUED SPEECH FOR AMERICAN ENGLISH
Handshape 1
/d, p, zh/
deep treasure
Handshape 2
/TH, k, v, z/
the caves
Handshape 3
/s, h, r/
sea horse
Handshape 4
/wh, b, n/
white bone
Handshape 5
/m, t, f/ & vowel alone
my taffy
Handshape 6
/w, sh, l/
wet shell
Handshape 7
/th, j, g/
thin jogger
Handshape 8
/y, ng, ch/
young child
Mouth
/ee, ur/
leisure
Chin
/aw, ue, e/
tall blue tent
Throat
/oo, i, a/
Look, big crabs!
Side
consonant alone
move 1" forward
Side Forward
/oe, ah/
boat dock
move 1/2" - 3/4" down
Side Down
/uh/
sun
Chin to 5 Throat
/oi, ay/
moist snails
Side to 5 Throat
/ie, ou/
light house
NCSA
National Cued Speech Association
800-459-3529 v/tty • info@cuedspeech.org • www.cuedspeech.org

Appendix E

Page 8
"No," said the girl.
"I like grapes.
Do you?"

Page 10
"No," said the boy.
"I like ice cream.
Do you?"

Page 12
"Yes," said the girl.
"I like ice ~~cream~~ cones, too!"

After the student has read the last page, turn to page 2, and ask the following questions. Note the student's responses.

T: Say: ***Point to the word said.***
What sound does said begin with? /s/
What sound does said end with? /d/
What letter makes that sound? *d*

3. TEACHER ANALYSIS

ORAL READING, PERCENT OF ACCURACY

Count and circle the number of miscues that are not self-corrected. Circle the percent of accuracy based on the number of miscues.

Word Count: 46

	EM	DEV	IND			
Number of Miscues	5 or more	4	3	2	1	0
Percent of Accuracy	89 or less	91	93	96	98	100

- If the student's number of miscues is 3 or less, continue the assessment with a Level 4 text.
- If the student's number of miscues is 4 or more, STOP!

DRA2 Continuum and Focus for Instruction

1. Circle the descriptors on the *DRA2* Continuum that best describe the student's reading behaviors and responses.
   - Add the circled numbers to obtain a total score for each section.
   - Record the total scores at the top of page 1.

Appendix F

DIBELS® Initial Sound Fluency

Short Form Directions

Make sure you have reviewed the long form of the directions in the *DIBELS Administration and Scoring Guide* and have them available. Say these specific directions to the student:

This is mouse, flowers, pillow, letters (point to each picture while saying its name). ***Mouse*** (point to mouse) ***begins with the sound /m/. Listen, /m/, mouse. Which one begins with the sounds /fl/?***

CORRECT RESPONSE: Student points to flowers, you say	INCORRECT RESPONSE: If student gives any other response, you say
Good. Flowers begins with the sounds /fl/.	***Flowers*** (point to flowers) ***begins with the sounds /fl/. Listen, /fl/, flowers. Let's try it again. Which one begins with the sounds /fl/?***

Pillow (point to pillow) ***begins with the sound /p/. Listen, /p/, pillow. What sound does letters*** (point to letters) ***begin with?***

CORRECT RESPONSE: Student says /l/, you say	INCORRECT RESPONSE: If student gives any other response, you say
Good. Letters begins with the sound /l/.	***Letters*** (point to letters) ***begins with the sound /l/. Listen, /l/, letters. Let's try it again. What sound does letters*** (point to letters) ***begin with?***

Here are some more pictures. Listen carefully to the words.

Show the student the first page of pictures. Ask the questions in the scoring booklet.

Timing is intermittent. After you finish asking the question, begin your stopwatch. Stop your stopwatch as soon as the child responds.

DIBELS® Letter Naming Fluency

Short Form Directions

Make sure you have reviewed the long form of the directions in the *DIBELS Administration and Scoring Guide* and have them available. Say these specific directions to the student:

Here are some letters (point to the student probe). ***Tell me the names of as many letters as you can. When I say, "Begin," start here*** (point to first letter), ***and go across the page*** (point). ***Point to each letter and tell me the name of that letter. If you come to a letter you don't know I'll tell it to you. Put your finger on the first letter. Ready, begin.***

Appendix G

PAF

PAF TEST OF SINGLE WORD READING

4.

absent	even	husband	gallon	pretend
happen	moment	bucket	silent	cabin
timid	plastic	habit	helmet	student
solo	splendid	fossil	canyon	frequent

5.

wade	mile	pole	rule	eve
blaze	quite	zone	cube	these
flake	stripe	drove	flute	theme
bame	shide	groke	vume	plete

6.

aim	deep	fry	clay	each
loaf	own	steam	bowl	greet
waist	sleeve	crow	spray	throat
gly	chay	fain	sneat	yoast