A STUDY OF INTERACTION IN A TUTOR/STUDENT DYAD USING COMPUTER ASSISTED INSTRUCTION (CAI)

by

JANE ROBINSON MIDDLETON

(Under the Direction of Michelle Commeyras)

ABSTRACT

This case study of the interaction between a tutor/researcher and an older student/subject who struggled to read her textbooks, focused primarily on factors that contributed to the co-construction of a zone of proximal development (ZPD) while using a computer software program designed to improve word recognition in older students (defined as age 9 and beyond). A secondary purpose was to determine if the software program, which could be used as a stand-alone supplement to the regular instructional program, would result in improved reading performance on a series of assessments without tutor assistance. The third purpose was to determine whether the student's performance on the series of assessments would improve measurably when she was assisted by the tutor as the software program presented the instructional content. Findings from this study suggest that the tutoring dyad successfully co-constructed and sustained performance in the ZPD during three sessions, which were marked by the student's increased verbal interaction, indications of sub-vocalization during internalization, a positive affective state, and assumption of increased responsibility for her own learning as indicated by questioning her tutor. With the use of the software as a stand-alone tool, the student

experienced intense periods of anxiety and frustration, even though there were small gains noted in sound/symbol recognition of some phonemes. While working with tutorial assistance, assessment gains were more pronounced in reading accuracy and comprehension when reading connected texts. The use of the computer software to present the instructional content was introduced to reduce the demands on the tutor, but the findings indicate its use interfered with the co-construction of the ZPD and did not reduce the tutorial demands. Further study of naturalistic tutoring dyads focusing on the integration of cognition, motivation, and self-regulation toward goal orientation is suggested.

INDEX WORDS: zone of proximal development; effective tutoring; CAI; struggling readers; semiotic mediation; situated cognition

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DEDICATION

I dedicate this dissertation to all the students who have helped me find ways to help those who struggle in their quests for literacy. You have prompted me to continue to seek ways of improving my practice and sustained me with your smiles of joy and pride as you have overcome your challenges. Very special thanks go to Brandon, Chad, Reba, Nelli-Anne, and Teauna.

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CHAPTER 1

RATIONALE

This study focuses on the interactions between a tutor and a student with the aim of positioning the student's learning in the zone of proximal development while using a computer software program to assist in developing proficiency in word identification.

Problem Statement

About 20% of the students in our schools experience early reading difficulties correlated with loss of confidence, lower levels of motivation, and poorer performance in later school years (Neuman, 2001). Without effective interventions, children who scored in the lowest quartile at the end of first grade remain below the 50th percentile at the end of the fourth grade (Juel, 1988). Stanovich (1986) reported that the gap between the achievement of these students and their peers continually widens. However, students' difficulties may be attributed to many different causal factors such as irregular school attendance, frequent school changes, lack of quality instruction, cultural variations from the mainstream culture in the school, physiological differences, family crises, and health issues. Our challenge as educators and researchers is to find effective ways of enabling all students to develop the reading and writing abilities prerequisite for academic success in general education classrooms.

Significance of the Problem

Policies and procedures, based on the assumption that early reading difficulties are indicative of deficits within individual students, have become entrenched in schools in the United States over the past 30 years (McEneaney, Lose, & Swartz, 2006). These deficits must be

remedied if the student is to achieve academic success in general education classrooms. When difficulties persist despite remedial efforts, these students are identified as disabled, and accommodation and interventions are offered through special education programs. However, the effectiveness of special education programs has been called into question by reviews and a meta-analysis that reported little or no academic benefit to students placed in these programs (Kavale & Glass, 1982; Madden & Slavin, 1983).

Individual tutoring programs provide a promising intervention for students experiencing literacy difficulties and the effectiveness of such tutoring programs is well-established (Bloom, 1984; Cohen, Kulik, & Kulik ,1982; Erlbaum, Vaughn, Hughes, & Moody, 2000; Shanahan, 1998). There have been on-going efforts aimed at providing tutors to assist students in developing literacy skills ranging from volunteers coming into the schools to work with selected students, to formally structured tutoring programs employing highly trained, experienced reading specialists.

One of the most successful is *Reading Recovery* (Clay, 1979, 1985), a one-to-one contingent tutoring program based on a transactional approach to literacy that rejects the traditional construct of disability. *Reading Recovery* has a 20 year history of moving 80% of the lowest performing first grade students in reading and writing classes up to the average range in a period of 12-20 weeks (McEneaney et al., 2006; Pinnell, DeFord, & Lyons, 1988). *Reading Recovery* is very expensive as it employs highly trained, experienced reading specialists who can serve a very limited number of first grade students. Numerous researchers have attempted to identify or develop more cost-effective services for larger numbers of students experiencing difficulties in order to serve those students in grades beyond first grade.

A variety of promising *Response To Invention* (RTI) approaches extend interventions to older students over longer periods of time (Fuchs & Fuchs, 2006; Gersten & Dimino, 2006; Klingner & Edwards, 2006; McEneaney et al., 2006). RTI approaches are founded on the assumption that students who respond poorly to instruction have deficiencies that impede their progress toward standardized benchmarks, placing these students at risk for disability (McEneaney et al., 2006).

Despite intense interventions, at least 15%-20% of treatment groups, or 3%-4% of all students, continue to struggle as readers (Leslie & Allen, 1999; Pinnell et al., 1988; Scanlon, Vellutino, Small, Fanuele, & Sweeney, 2005). For these students, contingent tutoring is recommended (Duffy, 2002; Klingner & Edwards, 2006; McCormick, 1994). Contingent tutoring involves tailoring instruction to provide more assistance when a student experiences difficulties, and decreasing assistance as the student becomes more proficient (Wood & Wood, 1996). Although the principles seem sound and straight-forward, in practice contingent tutoring makes enormous demands on the tutor (Gersten & Dimino, 2006; Wood & Wood, 1996). The contingent tutor must exercise sound professional judgments, based on moment-to-moment observations, in order to dynamically assess and interpret clues to a student's understandings as reflected in her actions, questions, responses, and engagement. This one-to-one tutoring is very expensive, and it intrudes on the life of the student as it requires time and effort apart from other students and activities. Therefore, it is important that the tutor stay attuned to the qualities in their interactions that facilitate learning in order to minimize time required and maximize benefits for the student.

Computers and networked technologies show promise for supporting teachers in meeting some of the task demands associated with assisting students in developing their reading abilities.

Most of the studies of computer assisted software (CAI) reviewed offered computer-based, supplementary instruction in addition to regular classroom instruction (Clarfield, 2006; Faux, 2004; Kutz, 2005; Macaruso, Hook, & McCabe, 2006; Troia & Whitney, 2003), and compared the achievement of students who used CAI with the achievement of those who did not. A few studies examined the effectiveness of electronic tutors that attempted to replicate the supportive interaction and feedback characteristic of effective human tutors (Dornisch & Sperling, 2004; Graesser, McNamara, & VanLehn, 2005; Magliano et al., 2005; Mostow et al., 2003).

The current study is unique in that CAI was used within the one-to-one contingent tutoring sessions with an older student (defined as age 9 or beyond). An assumption of this study is that the computer software, Lexia Learning Systems' Strategies for Older Students (Lexia SOS, 2005), can provide engaging instructional opportunities, offer immediate feedback, branch automatically to adjust the level of instruction as needed, and provide the tutor with a record of every response. The hope is that thoughtful utilization of a well-designed, quality computer program in the hands of a knowledgeable tutor can automate and structure some of the tasks, freeing the tutor to be more attentive, collaborative, and ultimately more effective in developing students' reading abilities.

Theoretical Perspective

Literacy studies have historically considered the cognitive, motivational, and sociocultural dimensions of literacy separately (Alexander, 2003). Those involved in the study of reading come from varied theoretical perspectives and diverse disciplines including anthropology, sociology, neurology, psychology, linguistics, and education. Additional contributions come from various clinical perspectives including vision, hearing, and speech and language pathologists. A major point of contention among reading educators involves whether

the reading act is best understood by breaking the process down into its component parts (discrete skills), or through a holistic approach because all the aspects appear to interact and function synergistically with one another.

To gain insight into this critical question, it is necessary to briefly consider the historical, institutional, and social contexts in which literacy acts are situated. A holistic perspective is emphasized by the sociocultural approach with a view of human thought as complex and chronologically rooted in personal sociocultural history and experiences, including psychological experiences "mediated by signs, symbols, and languages at individual and collective levels of experience" (De Valenzula, Connery, & Musanti, 2000, p. 112). Shifting away from the idea that problems lie within individuals, difficulties acquiring literacy are viewed as embedded in the culture of schooling through policies and practices.

The terms *reading* and *literacy* are sometimes used almost interchangeably as both terms are associated with constructing meaning. For the purposes of this study, the terms reading and literacy are confined to the context of printed texts. Reading is used primarily to refer to the collective processes involved in making meaning from printed texts. On one hand, the act of reading involves bringing sensory input from the outside world into one's private space in the mind where mental activity transforms this data into elaborated perceptions that contribute to the contents of thought. It is the nature of the mental activities constituting *thought* that is so elusive to study, particularly if one only considers one side of the communicative process. Literacy, on the other hand, connotes competence in reading and writing, or the ability to express thoughts generated in the internal space of the mind, transform the thoughts into words, and organize these words sufficiently to interact with and be understood by others. Literacy refers to the reciprocal communicative processes that occur when individuals attempt to share the contents of

their thoughts with one another, thus providing researchers with opportunities to make inferences about the nature of thoughts.

Historically scientific studies considered only what was directly observable to develop an explanatory theory to account for their observations, hypotheses were formulated, and situations were contrived to test this theory (Dillon, O'Brien & Heilman, 2000; Smith, 1965). This approach involved isolating the variables to reduce complexity. Because we are not able to directly observe the thought processes, many researchers excluded them from consideration when conducting empirical studies.

However, because the cognitive, motivational, and sociocultural dimensions appear to interact and function synergistically in reading (Alexander, 2003), there was always a sense that some of the more important aspects of the reading processes were missing; those processes taking place in the private space of the mind. The mind and the nature of thinking were also of interest to members of other disciplines who were generating other theories and employing other research methods. What had been lacking was an overarching theory that could encompass all of these aspects that converge in literacy acts.

In practice, contingent tutoring restores literacy instruction to its natural social context. The communications in a dyad are reciprocal, creating a space for the construction of shared meanings and enabling the thinking processes and needs of the student to be communicated to the tutor in multiple ways. These understandings enable the tutor to dynamically tailor the instructional approach to create optimal learning opportunities for the student.

In recognition of the multiple and varied disciplines and theoretical perspectives converging in this study, the frame of the sociocultural approach to mind is utilized (Wertsch, 1985, 1991, 1998; Wertsch, del Río, & Alvarez, 1995). Wertsch's approach is founded on a

commitment “to provide a beginning, an initial framework within which the voices of psychology and semiotics can come into productive dialogue with the voices of other disciplines” (1991, p. 5) in developing a theoretical framework and methodologies for dealing with practical matters extending beyond disciplinary boundaries.

Wertsch’s ideas extend the collective works of Vygotsky (1978, 1986) and Bakhtin (1981). Vygotsky’s contribution involves the following three basic themes: (1) reliance on genetic or developmental (historical) analysis; (2) higher mental functioning rooted in social communicative processes; and (3) individual and social actions mediated by tools and signs, including psychological tools, aimed at mastering individual behavior and cognition. Bakhtin (1981) contributed the term, *voice*, and the idea that human psychological and communicative processes are permeated by multivoiced dialogicism (Wertsch, 1985). The works of Vygotsky and Bakhtin help us to conceive of the human mind as socially constructed, at least partially, by all the language of historical others internalized in thought. Therefore, thinking in words is never a single-minded monologue, but instead is dialogic and multivoiced. Through this “speaking consciousness” (Holquist & Emerson, 1981), semiotic devices mediate human mental action. Wertsch (1985) reminds us that Vygotsky viewed the process of education as the passing on of social and cultural knowledge through a process of induction by the more skilled members of the culture. The task of the more skilled member is to enable the student to reflect and become more conscious by arranging the environment to lead the student to higher conceptual ground (Wertsch, 1985).

The relationship between learning and development begins the first day of life as a child interacts with adults and older children, but when a child begins formal schooling, efforts are made to match the child’s learning to his mental development, thus introducing a new element.

Finding that students who appeared to have equal levels of mental development varied in their abilities to learn under a teacher's guidance led Vygotsky to formulate the concept, zone of proximal development (ZPD). Vygotsky defined (ZPD) as "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (1978, p. 86).

This view articulates Vygotsky's concept of the social dimension of human learning through a process in which children "grow into the intellectual life of those around them" (1978, p. 88). In other words, children are enabled to perform actions in advance of their independent capabilities under the guidance of adults, or more knowledgeable peers, through imitation. In his work with young children, Vygotsky observed that learning focused on a child's current developmental level proved ineffective, leading him to conclude that "the only 'good' learning is that which is in advance of development" (p.89).

Purpose Statement

The purpose of this study was to use the lenses of the Vygotskian theory of learning to examine the interactions between the tutor and an older student in a contingent tutoring setting using word recognition software to present instructional content. A secondary purpose was to determine if the software would result in improved reading performance on a series of assessments without tutor assistance. A third purpose was to determine whether the student's performance on the same series of assessments would improve measurably when she was assisted by a tutor as the software program presented the instructional content.

Word identification is defined as "the process of determining the pronunciation and some degree of meaning of an unknown word. Note: Word-identification skills commonly taught are

phonic analogies, structural analysis, context clues, configuration clues, dictionary skills, and sometimes picture clues" (Harris & Hodges, 1995, pp. 282-283). Phonic analogies use letter sound/symbol relationships evident in known words to identify or create analogous sound/symbol relationships in other words, as in the study of word families.

Research Questions

This study is designed to answer the following three research questions in the case of an eleven year old girl interacting with her tutor/researcher and using Lexia Strategies for Older Students (SOS) ™, a computer-based word recognition software program.

1. What indications were there that the interactions between the tutor/researcher and the student established and sustained learning in the student's zone of proximal development on word recognition tasks?
2. Were word recognition skills improved by use of Lexia Strategies for Older Students (SOS) ™ software alone without intervention on the part of the tutor/researcher?
3. Was the student's rate of progress in word recognition increased using Lexia Strategies for Older Students (SOS) ™ software when there was interaction between the tutor/ researcher and the student?

CHAPTER 2

LITERATURE REVIEW

There are multiple areas of literature and empirical research pertinent to this study. First, I review the theoretical underpinnings of the concept of ZPD and identify some empirical research generally supporting the usefulness of this concept in education. Second, my focus turns toward the student, and the importance of attending to emotional as well as cognitive factors in dynamically assessing the zone of proximal development. Third**,** my focus shifts to the actions of tutors believed to be instrumental in creating and sustaining the ZPD. I identify the key responsibilities of the tutor, indicated by theoretical and empirical bases, involved in constructing a zone of proximal development in collaboration with a student. Fourth, I review research on tutoring effectiveness to determine the key factors identified in effective tutoring practices. Fifth, I review the literature and empirical research on the efficacy of computer software designed to assist in the development of fluent word recognition, concluding with an overview of the empirical findings of the computer software used in this study, Lexia Strategies for Older Students (SOS) ™.

What Can Be Concluded from Studies of Vygotsky's ZPD?

Vygotsky's works related to educational practices involve three theoretical constructs (Daniels, 2007): The general law of cultural development, the zone of proximal development, and the distinction between spontaneous concepts and scientific concepts.

The General Genetic Law of Cultural Development

The first construct is the general genetic law of cultural development, which focuses on the important function played by social interaction in learning. This construct can be explained through Vygotsky's words in translation as follows:

> Every function in the child's development appears twice: first, on the social level, and later, on the individual level; first between people (interpsychological), and then inside the child (intrapsychological). This applies equally to voluntary attention, to logical memory, and to the formation of concepts. All the higher functions originate as actual relations between human individuals. (1978, p. 57)

This general genetic law of cultural development is foundational to the study of what transpires in the interaction between a tutor and a tutee. It proposes that instruction must precede development.

The Zone of Proximal Development

The "general genetic law of cultural development" lays the theoretical foundation for the zone of proximal development (ZPD), the second major idea in Vygotsky's work with implications for education (Daniels, 2007). ZPD is the term Vygotsky used to signify the process where, in essence, "culture and cognition create each other" (Cole, 1985, p. 146). The ZPD describes the difference between what the student can do independently and what the student can accomplish collaboratively and cooperatively with the guidance of a more experienced other; in the context of this study, a tutor. The term applies to actual processes in which the child, or novice, is guided into gradually assuming the role of the adult, or more experienced other, while engaged interactively in culturally-based activities (Cole, 1985). The task of the tutor is to dynamically reassess and modify the interaction to keep the focus on the upper limits of the

student's ZPD as repetitive over-learning is likely to result in the student becoming bored and disengaged. Wertsch (1998) pointed out that not all mediating tools will be internalized or appropriated by the student, thus the focus during the teaching session must stay on the student's communications as expressed through dialogue or physical actions. The task of the tutor is to determine and provide the minimum action or support needed for successful task performance.

Spontaneous Versus Scientific Concepts

The third idea crucial to understanding Vygotsky's theories applied to education (Daniels, 2007) is the distinction between spontaneous versus scientific concepts. Spontaneous concepts are those that a student acquires vicariously as she experiences daily living activities. Spontaneous concepts tend to be more "immediate, social, and practical" (p. 311). Vygotsky referred to those concepts that are acquired as a result of instruction, usually by a teacher in a school setting, as scientific concepts. Daniels explained that these concepts are more systematic, hierarchical, and can be used consciously by a student. Vygotsky (1986) saw the school years as the "optimal period for instruction in operations that require awareness and deliberate control; [as] instruction in these operations maximally furthers the development of the higher psychological functions while they are maturing" (p.190).

Words and signs mediate mental operations (semiotic mediation), taking the form of psychological and cultural tools and facilitating the conception of a course of action to follow in problem solving (Vygotsky, 1986). Semiotic mediation provides a theoretical explanation of how external social, cultural, and institutional events can be transformed into psychological events within the thoughts of the individual. Verbal thinking makes concept formation possible by synthesizing processes begun in early childhood, including all basic intellectual functions (association, attention, imagery, judgment, and determining tendencies), to form new, more

complex wholes in adolescence. Bruner (1985) explained how the words used in interaction are taken within the student's consciousness (internalization) where they become psychological and cultural tools that influence and enable future independent action. Words also provide the foundation for metacognition in which one develops the awareness to monitor and assess one's own learning. This awareness affects motivation and one's personal sense of self-efficacy (Marzano, 2003; Squire, 2003).

Vygotsky focused on what Wertsch (1985) referred to as "interpsychological" processes in which two, or a small group, of individuals engage in social interaction that can be studied in terms of group dynamics and communicative practices (p.60). A key concept involved is the process of "internalization," which Vygotsky (1978) defined as "the internal reconstruction of an external operation" through a series of transformations:

> *(a) An operation that initially represents an external activity is reconstructed and begins to occur internally….*
>
> *(b) An interpersonal process is transformed into an intrapersonal one….*
>
> *(c) The transformation of an interpersonal process into an intrapersonal one is the result of a long series of developmental events….* (pp. 56-57).

Vygotsky explains that speech turned inward becomes internalized language "determined by a historical-cultural process." This internalized language progresses through a series of transformations in which "*the nature of the development itself changes* from biological to sociohistorical" (Vygotsky, 1986, p. 94).

Nassaji and Cumming's (2000) case study of a young student learning English interacting through dialogue journals with his teacher over a 10 month period provides strong empirical

support for Vygotsky's concept of zone of proximal development. The main purpose of this study was to document the nature of a ZPD and study its construction, particularly in the context of language instruction. This notion that good learning can occur in advance of development was supported in this study. Nassaji and Cumming concluded that students can perform a task that is more complex than they can fully understand when their performance has been aided through dialogue with a more knowledgeable other. In fact, even independent functional performance can precede conceptual development, once psychological and cultural tools move from the interpersonal, dialogic realm to the intrapersonal realm.

To gain an understanding of how these processes might unfold in a natural tutoring setting, consider an example of a tutor working with her student to identify long "a" vowel sounds following the vowel-consonant- "silent-e" pattern (as in "late"). Repeatedly, the tutor guides the student in determining the vowel-consonant- "silent-e" pattern, noting that where the pattern exists, the "e" is silent, but the sound of the long "a" is the same as its name. Finally, after a long sequence of events, the student begins to initially indicate she is internalizing the process by verbalizing that the pattern exists when "a" says its name in the word and "e" is silent. At times, you may notice indications she is saying the words used in the instructional phase to herself when her lips move as if she is speaking, but without vocalizing sounds. These occasions are considered private speech, defined as speech for oneself as opposed to addressing another, indicating that internalization is in process (Winsler, Fernyhough, McClaren, & Way, 2005). Later in the process of internalization, without comment the student is observed scanning words not recognized immediately for evidence of the vowel-consonant-"silent-e" pattern, among the other patterns she knows. She has now developed a repertoire of cultural tools (phonetic decoding exists only in the culture of educational institutions) for decoding vowel

sounds. Through the process of internalization, she has transformed these patterns into psychological tools that she now uses as a plan for systematically decoding words she does not immediately recognize. Her pre-conceptual development is shifting from the notion of strict mapping of letters to sounds, and is now in a process of transforming into the idea that words are constituted of sound units. Such units may include letters that when grouped in specific patterns, represent unique units of sound, and these groups of letters in combination may include silent letters. Further, she is beginning to notice that the rules do not consistently apply in the English language.

In this example, the tutor is guiding the student's view of words as a collection of sounds represented by letters, a scientific concept. She is also acquiring the idea that reading involves decoding sounds. However, this idea may confuse a student who uses whole words to represent meanings, a spontaneous concept. She may not have developed the concept that these words are made up of sounds represented by letters, or that different patterns of letters in various combinations may be used to create the same sounds in different words (scientific concepts).

To be sure that the tutor and the tutee are achieving a state of mutual understanding, interaction is required. This interaction may be nonverbal, in which the tutor interprets facial expressions and body language, but communication in words is preferable as shared language is more indicative of the nature of thoughts. Vygotsky (1986) explained that every verbal expression is engendered by thoughts, and transitioning from thoughts to words is a complicated, inexact, process. Vygotsky pointed out that "thought does not express itself in words, but rather realizes itself in them" (p. 251). Only through dialogue with a student using words can the tutor get a glimpse of the thinking transformed into words. Vygotsky regarded the relationship between speech and action as "part of *one and the same complex psychological function*"

(1978, p. 25), noting that initially speech accompanies action consisting mostly of description and situational awareness, gradually becomes more strategic as the focus shifts to problem-solving, and finally precedes action by taking on a planning function. This planning function is dependent upon action, conceived and mediated in thought prior to being realized in behavior. As the student puts her thoughts into words, she may become aware of gaps in her own understanding (metacognition), creating interest in filling these gaps and spawning goal-directed behaviors such as questioning. Verbalizing her understandings creates opportunities for dialogue with her tutor, who will provide additional instruction or clarification as indicated. For example, the tutor might begin with the idea that there are a number of ways that certain sounds can be represented in print, present the most common spelling patterns, and assist the student in understanding that word spellings may depend on the meaning of the word in the larger context of a sentence or paragraph.

Intellect and Affect Unite in Thought

Vygotsky (1986) was very interested in the generation of thought and proposed that every thought was sparked by an affective-volitional tendency. He believed thought was engendered by motivation, or goals, constituted of desires, needs, interests, and emotions. Therefore, in his view, the separation of intellect and affect emerged as a major problem of traditional psychology. Vygotsky distinguished between emotion and feeling. He defined emotion as affect plus action and feeling as affect without action (Bruner, 1987, 1999).

Vygotsky proposed a unit analysis as a way of studying "a dynamic system of meaning in which the affective and the intellectual unite," in which "every idea contains a transmuted affective attitude toward the bit of reality to which it refers," permitting "us to trace the path of a person's needs and impulses to the specific direction taken by his thoughts, and the reverse path

from his thoughts to his behavior and activity" (1986, pp. 10-11). In the analysis of verbal thought, Vygotsky concluded that "thought is not the superior authority" in that "it is engendered by motivation, i.e., by our desires and needs, our interests and emotions" providing "the answer to the last 'why' in the analysis of thinking," the motivation that engendered the thought (p.252). Vygotsky explained that a full understanding of the thinking of another requires an understanding of the affective-volitional tendency that engenders thought. He expressed this idea as follows:

> To understand another's speech, it is not sufficient to understand his words—we must understand his thought. But even that is not enough—we must also know its motivation. No psychological analysis of an utterance is complete until that plane is reached. (p. 253)

What Indications of ZPD Should I Look For in My Focus on the Student?

In the interaction of the tutor/student dyad, the student holds the position of center stage. It is the student's dialogue, actions, understandings, thoughts, and emotions that are of primary concern in the teaching-learning process. The usefulness of the concept of ZPD is to assess the *student's* level of understanding so as to predict what she may be able to do collaboratively while interacting with a more knowledgeable tutor serving as her guide (Vygotsky, 1986). Empirical evidence supports the effectiveness of intervention in the form of adult (or more experienced) guidance and scaffolding that enhances learning and ultimately results in higher level, generalizable concepts (Coltman, Petyaeva, & Anghileri, 2002; Nassaji & Cumming, 2000).

Tutor/Tutee Interaction

The relationship between the tutor and the tutee is central to the concept of the ZPD, because the ZPD must be co-constructed and that requires that both parties consciously desire a

relationship that involves shared thinking (interpersonal) and deep understanding (intrapersonal). This connection must entail a relationship in which the student develops trust in the tutor and believes the guidance provided will be helpful. It also requires that the tutee is willing to engage in a relationship of this depth with the tutor. This willingness to engage must be cultivated over time by convincing the student that the adult cares about her and wants to assist with her learning or understandings (Dipardo & Schnack, 2004).

A Warm, Caring Interpersonal Relationship

It is the interaction, and perhaps the interrelation, between the student and the tutor that materializes into the zone. “Understanding happens *between* people; it can’t be attributed to one individual or the other” (Rogoff, 1990, p. 67). Goldstein (1999) argued that constructs such as intersubjectivity, the zone of proximal development, guided participation, and scaffolding are inherently relational, and resemble caring encounters. She proposed an “interrelational dimension” that precedes and “facilitates entry into the zone of proximal development, continues during the pair’s experience in the zone, and emerges after the learning experience in a transformed and deepened form” (p. 651).

Positive Affect

A student’s positive affect toward the tasks and willingness to enter into interaction and dialogue are important indications of the co-construction of a ZPD. Studies suggest positive correlations between higher achievement and positive affect (Bjørnebekk, 2008; Frederickson & Branigan, 2005). Fredrickson (1998) provided a model of positive emotions, based on her empirical evidence, that she suggests broadens the thought-action repertoire, and in turn, builds physical, intellectual and social resources. She claimed that the important roles that positive emotions play may have been overlooked as positive emotions are fewer and less differentiated

than negative ones, yet she cited research that “positive emotions may undo the after effects of negative emotions” (p. 313).

The Instructional Content Must Be Intellectually Challenging

One-to-one tutoring provides immediacy beyond any other instructional model, which can be useful in sparing the student from boring repetition while at the same time stimulating interest through accelerated pacing. Individual tutoring provides both the tutor and the student opportunities to interact directly, check for understanding, ask and answer questions, reveal analytic and problem-solving processes by thinking aloud, and adjust the content and pacing of instruction to fit the student’s unique needs. Matthews et al. (2007) found mixed evidence concerning the correlation between higher achievement and one-to-one interaction, concluding that a positive correlation exists only when there is asymmetry between the student’s preparation and the degree of cognitive challenge presented by the instructional content.

Instruction Aimed Toward the Upper Limits of the Student’s ZPD

As the zone of proximal development is a dynamic state, constantly in flux, dialogue between the tutor and the tutee provides on-going feedback. When the student falters slightly, the tutor has an opportunity to scaffold performance by doing for the student only that which she cannot yet do for herself. Matthews et al. (2007) confirmed that tutors covered different content during their individual sessions with tutees in which they were able to assess the student’s understandings, clarify key points as needed, remedy any misunderstandings, and supply additional information to bridge apparent gaps in a student’s knowledge.

The Student Assumes Increased Responsibility and Autonomy

A tutor, who times her interventions wisely and with care not to belittle the student by doing too much, confirms her belief that the student is capable and will soon be able to

accomplish the tasks independently. When the student is successful in describing a concept, process, or solution to a problem in words, the student is developing the ability to successfully function in the culturally prescribed manner. Her articulation of the modular elements of a task, and her successful performance, alert her tutor to fade support and raise instruction to a higher level of complexity (Bruner, 1985). With additional experience, the student engages in planning and assesses and evaluates her own performance.

The Tutor Attends to the Affective, Volitional, and Cognitive Aspects of Learning

It is apparent that Vygotsky intended that a tutor attend to the affective-volitional aspects of a student's participation as well as the cognitive aspects. However, much of the early work in exploring the relationship of thought and emotion in literacy focused more on the detrimental effects of anxiety in struggling readers (Dipardo & Schnack, 2004). However, two studies stand out in the literature that report on how students acquired high levels of literacy after experiencing serious difficulties in their literacy instruction in school settings.

McCormick (1994) reported a case study of literacy acquisition in a student performing initially in the first percentile, who developed literacy skills beyond the grade placement appropriate for his age. She tailored instruction for him underpinned by the interactive theory of reading (Lipson & Wixson, 1986) in which literacy learning is related to factors internal (i.e., cognitive and motivational factors) and external to the reader (i.e., instructional frameworks) as the theoretical base. An instructional strategy involving multiple exposures in multiple contexts was developed specifically for him, placing special emphasis on practices designed to promote engagement and focused attention. The inclusion of games and enticing activities were considered essential to his task involvement. A daily charting of his performance provided a

visual reference of his slow but continuing progress, which encouraged him to persevere. Emotional factors were subsumed under the heading of motivational factors in this study. Clarification of motivational factors involved included expectancies for success or failure and attributions that related success to factors other than innate, immutable abilities. A postulate was that instructional interventions had to account for low levels of motivation, particularly in the early stages of instruction, to counter the likely onset of a host of avoidance behaviors designed to remove the possibility of failure.

The second study conducted by Fink, (2006) involved the profiles of 66 high achieving adults who struggled in their quest for literacy compared to the profiles of another, smaller group, who were matched based on their high achievement who had not struggled in acquiring literacy. Results of this study lead to the development of the Interest-Based Model of Reading based on five components: 1) sustained reading is earmarked by passionate personal interests, 2) these personal interests result in avid, topic-specific reading leading to the development of competencies in reading, 3) familiar schema scaffold literacy enabling progressively higher-level reading, 4) contextual strategies are content-specific, leading to differential fluency in different content areas, and 5) strong mentoring support is essential to the process. Fink concluded that different children take different paths to literacy, and strongly opposes one-size-fits-all approaches. Finally, she concluded that “Teaching reading is not about finding ‘the right’ cognitive methods, but also about matters of the heart—passion, a burning desire to know, a tender bond between a teacher and a student” (pp. 140-141).These studies underscore the importance of attention to emotional factors, cognitive factors, and success/failure attributions when working with struggling readers. Emotional factors can enhance or impede progress as they are primary in determining the level of motivation and volition (will) within the student. In both

studies, factors leading to ultimate success align with indications of functioning in the ZPD. These factors include:

- Interest, which is indicative of a positive emotional state
- A strong bond with a mentor or tutor who scaffolds tasks to ensure success, providing a warm, caring relationship with increasing cognitive challenge
- Task generalization to different contexts, which involves transfer and generalization of concepts and reflects transformations
- Persistence in reading familiar topic-specific texts in progressively more challenging reading selections, requiring focused attention to meet the increased challenge
- The expectation of eventual success attributed to hard work and task persistence, reflecting causal attribution for success based on effective strategy usage.

Johnston (1985) stressed that effective text-based strategies can be taught, and the realization of success in developing literacy skills is much more powerful than external feedback in bolstering motivation. The interaction between a student and a tutor that enables performance at a more advanced level leading to development of independent performance is a paraphrase of the definition of ZPD.

What Is the Role of the Tutor in Co-constructing and Sustaining the ZPD?

Due to his early death, Vygotsky was unable to fully develop his thoughts on precisely what the adult or peer should model or do to locate the learning in a student's ZPD. Bruner (1985) detected an apparent paradox in Vygotsky's work in considering the following premises:

> Human learning presupposes a specific social nature and a process by which children grow into the intellectual life of those around them. (Vygotsky, 1978, p. 88)

> Thus the notion of a zone of proximal development enables us to propound a new formula, namely that the only '*good learning'* is that which is in advance of development. (p. 89)

Bruner questioned, "how could 'good learning' be that which is in advance of development and, as it were, bound initially to be unconscious since unmastered?" (1985, p.24). He finally reconciled the paradox by focusing on Vygotsky's idea of cultural and psychological tools, in which humans use cultural tools outside themselves to master themselves from the inside as interpersonal relations are transformed to become intrapersonal.

The zone of proximal development is co-constructed by the tutor and the student. Due to the power differentials between a tutor and a tutee, it is necessary that the tutor take the lead in establishing a close, emotionally warm, and intellectually challenging relationship (Chak, 2001; Dipardo & Schnack, 2004). A tutor must earn and maintain the trust and respect of the student, serve as a good model of the cultural means and methods for problem-solving and completing prescribed tasks, assess sensitively and monitor her student's understandings, encourage the student to put new learning into immediate practice, and fade her support as quickly as possible. When the tutor and the student are functioning in the zone, the tutor extends the student's functional level and serves as a catalyst for new learning by modeling the executive functions of consciousness. Such functions include sequencing task units, applying cultural and psychological tools, establishing a positive emotional climate, and creating opportunities to apply new learning in novel problem-solving situations. Therefore, in analyzing the tasks to be accomplished by the tutor in constructing the ZPD, I have constructed the following summary of my understandings:

- Establish a warm, supportive tone and maintain a positive emotional climate throughout the sessions.

- Think aloud, verbalizing your stream of consciousness, to model the use of cultural and psychological tools until the student's independent use of these tools comes under her own conscious control.
- Use verbal and other semiotic scaffolds to guide the student through successful problem-solving.
- Fade the scaffolds as soon as the student is successful to facilitate a sense of self-efficacy and prevent the task from losing the degree of challenge necessary to sustain engaged learning.
- Create situations enticing the student to utilize new learning in independent practice.
- Attribute success to persistence and effort, and challenge any attribution of failure to immutable individual characteristics.

What Can We Conclude From the Evidence on Effective Tutoring?

Since learning in the ZPD would be expected to promote more rapid learning and development, the analyses of factors essential to sustained learning in the zone of proximal development should align with the empirical evidence on the efficacy of tutoring and the characteristics of more effective tutors. Alignment of these factors would lend support to the usefulness of the concept of ZPD in guiding tutor actions and creating an optimal tutoring climate.

Three meta-analyses of the effectiveness of tutoring (Cohen et al., 1982; Erlbaum et al., 2000; Shanahan, 1998) included a wide variety of situations such as one-to-one and small group tutoring using highly skilled reading professionals, volunteers with varying degrees of training and support, and peer tutors. The positive effects of tutoring were confirmed in raising student achievement and promoting positive attitudes toward the subject matter. The findings of this

meta-analysis were confirmed by Labbo and Teale, (1990) in a study of cross-age reading as a strategy for helping poor readers. They reported growth among all participants, both tutors and tutees, in achievement and more positive attitudes toward learning.

Most tutoring leads to higher achievement and more positive attitudes toward the subject matter, but not all tutoring situations are equally effective. Reading Recovery, an intense one-to-one reading program for first grade students has returned 80% of students struggling to acquire early literacy to average literacy levels in a period of 20 weeks or less and is widely recognized as among the most effective literacy tutoring programs (McEneaney et al., 2006). However, the teachers in Reading Recovery are highly trained, and participate in ongoing professional staff development and support. Although tutoring programs of all types are usually somewhat effective, professional development and on-going support increases the effectiveness of interventions, especially for beginning tutors (Erlbaum et al., 2000; McEneaney et al., 2006; Pinnell et al., 1994).

Indications of intensity such as the tutoring ratio and the amount of tutoring are also factors in considering the effectiveness of tutoring in early literacy. In a study of an intense year-long tutoring program with first graders in groups of three, students were reported to make substantial gains, but their performance did not reach the level of their average first grade peers (Mathes et al., 2005). This study suggests that although there may be significant growth in small group tutoring situations, they may not be as effective as one-to-one Reading Recovery sessions, even though both situations use highly qualified tutors and well-defined instructional programs. Mathes (2005) and her colleagues suggested further comparative research on group size in early literacy tutoring to determine if one-to-one tutoring is affirmed as more effective, and if group

sizes larger than the 1:3 ratio they used might be as effective, because group size has a large effect on cost.

In a carefully controlled study of kindergarten students (Al Otaiba et al., 2005) randomly assigned to 30 minute tutoring sessions either 4 days per week, 2 days per week, or to a control group that involved a tutor reading aloud to the students, the 4 days per week students significantly outperformed the 2 days per week students and the control group. However, there was no significant difference between the 2 days per week students and the control group.
The empirical evidence indicates that the ideal tutoring situation provides training and on-going support for tutors and involves one-to-one tutoring in a high-intensity tutoring program. As these factors decline, the effectiveness of the tutoring program also declines.

The importance of interaction and dialogue was also confirmed in a study of the accuracy with which novice tutors could monitor student understandings (Chi, Siler, & Jeong, 2004). Though they found little indication of intersubjectivity being achieved in these novice tutoring dyads, they concluded that the effectiveness of tutoring was due to constructive learning on the part of the students in combination with some undefined forms of interaction, falling outside the realm of pedagogical skills of the tutors. These findings suggest that the increased opportunities for dialogic interaction in dyads or small groups are associated with enhanced student learning and more positive dispositions toward the subject matter covered in tutoring settings. They also support the conclusion that interaction and dialogue, key characteristics of ZPD, are important factors in improving instructional outcomes.

A few studies focused on the interactive and interrelational processes involved in more effective literacy tutoring. Juel (1996) identified three practices used more frequently by effective student athletes enrolled in a college program where they served as reading tutors:

direct instruction in decoding; instructional scaffolding by simplifying the problem or providing clues or hints; and providing motivational scaffolding in which the tutor offered encouragement and alluded to the connection between improvement and more frequent reading practice.

In a study comparing *Reading Recovery* with two other structured programs in reading Pinnell et al. (1994) identified the following patterns emerging among the most effective tutors: tutors gave more prompts but supplied fewer words; the prompts were tailored to address each student's difficulty; and effective tutors gave more specific feedback. Cromley and Azevelo (2005) identified four categories of tutor actions associated with more effective practices in each of the four areas as follows:

1) Instruction – Expert tutors articulated specific facts, concepts, procedures, or gave rules rather than telling students information; used analogies rather than long segments to increase understanding; summarized what was covered at the end of each session; and sometimes gave an answer to a problem. Expert tutors planned for instruction.
2) Cognitive Scaffolding – Expert tutors used a wide range of scaffolds such as simplifying content, hinting, asking questions that require elaborated answers, pumping students for clarification, and prompting students.
3) Motivational Scaffolding – Expert tutors provided positive and negative feedback, offered choices, and made statements attributing progress to efforts expended.
4) Questioning – Expert tutors asked deep questions and hinted at error more often than providing direct answers.

Collectively, these studies emphasize the importance of staying attuned to all aspects of students' actions: cognitive, emotional, and physical. The dynamic, constantly shifting quality of the ZPD is affirmed. As the student is developing skills and internalizing bits of dialogue, the ZPD will shift to higher levels. Affective factors and indications of waning motivation must be carefully considered as they often signal mismatches between the instruction and the student's needs. The theoretical concept of ZPD is closely aligned with the factors associated with tutoring effectiveness; therefore it is a useful concept in gauging preferred practices and determining the appropriate level of support in natural settings with individual students.

Can Computer Software Assist Students in Developing Word Recognition Abilities?

Critics may question the usefulness of computer software in literacy instruction because computers cannot engage in dialogue with a student or form a supportive personal relationship--characteristics strongly associated with learning in the student's ZPD. Yet computer software offers an opportunity to provide quality extended practice, give immediate feedback, employ scaffolds, adjust the level of difficulty as needed, and keep a continual record of students' responses, even when they are engaged in independent practice. Also, many educators have noted the affinity many students have for computer activities, particularly when a game-like format is used.

Researchers are interested in the potential of computer software to complement traditional print instruction and become an important part of early literacy instruction (Kuhn & Stahl, 2006). McKenna (2002) is a proponent of phonics software based on an understanding of how children acquire phonics knowledge, noting that "some students require explicit instruction in phonics, while others seem to acquire knowledge of the alphabetic principle through indirect means" (p. 94). Students who spend extended time on phonetic decoding skills may have limited

opportunities to develop higher level comprehension skills such as inferring, summarizing, or analyzing (Fink, 2006; Juel et al., 2003). Computer software aimed at providing instructional scaffolding as needed for word recognition could possibly afford selected students extended access based on their needs, allowing them to participate with their peers in opportunities to develop higher level comprehension skills.

Not all students respond positively to skills-based interventions in reading (Dillon et al., 2000; Klingner & Edwards, 2006). For these students the instructional format needs to shift toward more strategic approaches that utilize a variety of word study activities, such as using word study, making patterns in words more explicit, illuminating shades of meanings, and using word games often favored by older students (Greenwood, 2002). Computer software used as a supplementary extension of regular classroom instruction may provide some of these activities and shorten the time required for students having difficulties developing skills.

Studies of computer software assisting in the development of word recognition skills are largely of the skill and drill variety that use game-like formats preferred by students over independent worksheets (Balajthy et al., 1999). The term, *word recognition*, refers to complex processes, dynamically interrelated, encompassing an array of skills under the broad headings of familiarity with print, phonemic awareness, phonological awareness (including phonics), and skills involved in interpreting contextual meaning (Harris & Hodges, 1995; Pikulski, 1997).

In two studies, computer software was used to teach sight word recognition (Lee & Vail, 2005; Lewandowski, Begeny, & Rogers, 2006), suggesting that software is effective in teaching sight words. Lee and Vail (2005) claimed that computer assisted instruction could be a valuable time saver for teachers in planning and preparation for instruction. Lewandowski et al., (2006) found that the students in both the tutor-assisted and the computer-assisted groups were

significantly and equally enabled to improve their reading accuracy and fluency over the control group. They concluded that the intervention was effective in causing reading to require less effort, which allowed for more concentration on meaning construction and metacognition.

A third study of the value of computer-based instruction on early reading skills (Mioduser, Tur-Kaspa, & Leitner, 2000) divided 46 Israeli five to six year olds considered at high risk for learning disabilities into three comparison groups: a group of students using a software program entitled *I've got a secret, I can read*, a group receiving intervention using only printed materials, and a group receiving no intervention. Results indicated students in the computer software group achieved significantly higher on measures of phonological awareness, letter recognition, and word recognition over both of the other groups. The authors attributed the results, at least partially, to the higher level of motivation noted in the computer group.

A year-long study evaluating the efficacy of Project Listen's 1999-2000 Reading Tutor (Mostow et al., 2003) compared the group performance of 131 second and third grade students divided into three groups: a group using a computer automated reading tutor that listens, a group tutored by a human, and a group receiving only classroom instruction. While there were no significant differences between the groups in word identification or fluency, both the human-tutored and the computer-tutored groups outperformed the classroom group significantly in word comprehension and suggestively in passage comprehension. The human-tutored group significantly outperformed the other two groups on measures of oral reading fluency and word attack skills using the Woodcock Reading Mastery Test. These results were similar to earlier results obtained using the 1998 version of the Reading Tutor. The researchers also focused on process variables by reviewing 40 videotaped sessions and analyzing 6,080 logs of human and computer tutoring sessions. They found that human tutors used less rereading, more frequent

writing, corrected more errors, focused more on individual letters, and provided assistance more interactively by assisting students in sounding out more words than the Reading Tutor. They also found the students using the computer tutor lost significant amounts of time waiting for the Reading Tutor to respond, requested help more often, and selected easier reading stories than the human-tutored group.

In addition, quite a few studies on products of Lexia Learning Systems (Clarfield, 2006; Faux, 2004; Kutz, 2005; Macaruso et al., 2006; Macaruso & Walker, 2008; Stevens, 2000; Marsh, 1995) were reviewed, as one of their products, *Lexia Strategies for Older Students (SOS)* ™, was used in this study. While general references such as comments that students used age-appropriate Lexia software, or students advanced to Lexia SOS when they completed a program designed for younger students, there was no study found indicating the effectiveness of the Lexia SOS software at the onset of this study. However, after data collection and analysis were complete, a study (Macaruso & Rodman, 2009) was published in which the Lexia SOS software was used as a supplement to the core curriculum over a school year with middle school students in remedial classes taught by the same teacher. This study used an experimental design employing statistical analysis to determine the significance of mean gains reported in the experimental group compared to the control group. Findings indicated significantly greater gains over the control group on the word attack, letter-word identification, and the passage comprehension subtests of the Woodcock-Johnson III Tests of Achievement (Woodcock, McGrew, and Mather, 20001).

Overall, this body of research appears very weak. Only Kutz (2005) appears to have had no prior relationship with Lexia Learning Systems in studies reporting favorable outcomes for Lexia products. It appears that many of these studies may be plagued with methodological flaws

as well. In addition, where significant findings were reported, these findings were often overstated. For example, when a significant finding was found on one of three measures in first grade students, the results were reported as significantly positive for first grade students. However, there were findings that seemed to resonate with findings in other studies. Student's reported preference for this type of computer assisted instruction over traditional seatwork, and students found the computer-based activities motivational, though students were not as motivated as their teachers had anticipated.

Phonics skill-based instruction is not always associated with scaffolded learning experiences designed to tailor instruction to fall within a student's ZPD, as evidenced by Graves & Graves (2003), which specifically excluded word identification skills from their scaffolded reading experiences (SRE) framework. Yet, these studies suggest that word recognition and phonetic decoding may progress more effectively with a human tutor, particularly for those students experiencing difficulties with early literacy. This finding indicates that word recognition and phonetic decoding skills may be scaffolded to place a student in her ZPD.

The computer has been established as an effective, less costly, and somewhat motivating tool for extending practice beyond the traditional classroom setting. In addition, instruction on the computer affords struggling students a degree of privacy not easily accomplished in the traditional classroom setting. Much more sophisticated interactive software capable of scaffolding for weak skills, as necessary, is becoming available to assist in the metacognitive development believed to be so crucial in improving reading comprehension.

The answer to the introductory question is affirmative. Computer programs can assist students in developing their word recognition abilities. Both computer assisted instruction in word recognition and tutoring were found more effective than traditional classroom instruction

using individual worksheets for additional practice. However, in all the studies reviewed, computer software was used as a stand-alone supplement to the classroom reading program. There were no studies found in which computer software for word recognition was incorporated as an integral component of instruction.

This study examines how the software used as a stand-alone supplement to her previous instruction affects a student's performance, in comparison to her performance when the software is incorporated as an integral part of the individual tutoring sessions. In this study, I observed closely how one student responded to the software when she was working independently, and compared it with her responses when I assisted as her tutor. This study also provides a focused view of student-tutor-software interactions and offers insight into how the use of computer software had an impact on this one-to-one tutoring situation. Incidences of scaffolding and indications of the student's functioning in the zone of proximal development are the focus of attention in the tutor-assisted phase of the study. This study is also unique in that study of the tutor-tutee interaction includes cognitive, emotional, and motivational factors that provide a more in-depth, contextualized understanding of one student and her tutor's interactions aimed at positioning her learning in her dynamic zone of proximal development.

CHAPTER 3

METHODOLOGY AND METHODS

This study is a case study meeting the definition of an in-depth study of singularity conducted in a natural setting (Bassey, 1999). Case study research is suited to the study of complex processes within a single individual, providing opportunities for qualitative and quantitative data to be combined by triangulating data. Gaining insight into the interaction between one student and her tutor using a computer program to intervene on the automaticity of the student's word recognition offers the possibility of identifying trends and heuristic developments within this single student in addressing the focused research questions (Hays, 2004).

The case study offers unique opportunities for examining complex situations, by searching for patterns in relationships and between factors (Purcell-Gates, 1995). However, generalization is not afforded primacy in case study research, because illuminating and understanding the uniqueness of the case is deemed most important (Hays, 2004). Furthermore, Lincoln and Guba (2000) challenge the notion that any research can be generalized, even though this is the goal of research in the formalistic, scientific discourse. Their explanation follows:

> Local conditions make it impossible to generalize. If there is a 'true' generalization, it is that there can be no generalization. And note that the working hypotheses are tentative both for the situation in which they are first uncovered and for other situations; there are always differences in context from situation to situation, and even the single situation differs over time. (p.39)

Rather than generalizability, Lincoln and Guba propose a concept of *transferability*, which compares the fit in one context to the fit of another, depending upon the goodness of fit between the contexts. Stake (1995) asserted that people learn a great deal from cases that include general information. Because these people are familiar with other cases through direct experiences and through receiving "explicated generalizations" from authors, teachers, and authorities, they are able to generalize from the collective of these cases or modify their old "naturalistic generalizations." "Naturalistic generalizations" are defined as "conclusions arrived at through personal engagement in life's affairs or by vicarious experience so well constructed that the person feels as if it happened to themselves" (p. 84). Therefore, integrating these findings collectively with other studies of older students who struggled with reading may lead to enhanced understanding of the challenges to be overcome, and development of more effective practices.

Participants

Amber, the Student/Subject

This case study focuses on my interactions with an eleven year old girl entering 5th grade, who selected the pseudonym, Amber, to protect her privacy while participating in this study. She lagged behind her classmates due to difficulties with word recognition and spelling. Her teachers' concerns about her difficulties led to her referral and subsequent identification as a student with a specific learning disability in the spring of her 4th grade year. The explanation of her specific learning disability follows:

> The student has significant discrepancies between ability and achievement in the areas of Broad Reading and Numerical Operations. Intensive IST [Instructional Support Team] and Title I services were implemented with very little success

> being documented with below average/failing grades in math and language arts. Attention related difficulties were also noted in the Psychological Evaluation. (Eligibility Committee Summary of Deliberations, 1/31/07)

Amber participated in a resource class to address her weaknesses near the end of 4th grade. During the summer, she was required to attend summer school during the month of July. Near the end of July, she learned that she had passed the reading section as well as all other sections of the state-mandated testing program taken during the spring of her 4th grade year.

Amber was available to participate in this study during the month of August, just prior to entering 5th grade in September. In our conversations about her possible participation in this study, I attempted to reframe Amber's school difficulties away from the idea that she has a learning disability. Instead I offered the possibility that her problems with word recognition and spelling were the result of irregular school attendance and the protracted period of turmoil in her family during her primary grades in school. Her passing the state-mandated test in reading at the end of 4th grade suggests that her difficulties were resolving and it added credence to the idea that her difficulties could be attributed to the disruption in her school experience during the early years rather than to her having a learning disability. Therefore, I shared with her my hope that she would not continue to require services for students with learning disabilities long-term. Working with the word recognition software in this study could help her to overcome her difficulties in reading and spelling. Amber was eager to get started and wanted to make up all the phonics instruction she had missed!

A review of Amber's history reveals that her early years were marked by separation, loss, and turmoil causing prolonged periods of instability. She spent her early life in the home of her paternal grandparents. Because her father traveled in his work, his parents held legal custody.

When Amber was three, her father remarried and moved out of the family home. While Amber was in kindergarten, her grandfather died. Both Amber and her grandmother had considerable difficulty adjusting to her grandfather's death, resulting in a period of less stability, which was deteriorated further when her grandmother was seriously injured in a car accident. These factors resulted in turmoil and irregular school attendance. Amber repeated first grade. Her father and his wife became concerned for Amber's welfare and after protracted proceedings spanning 4 years; they finally gained legal custody and moved her into their home in a neighboring state. Amber was midway through 3rd grade in school. From conversations with Amber about her family, it appeared that she had made a relatively easy adjustment to life in her new home with her father, step-mother, older step-sister, and her younger nephew. They also supported her continuing her close relationship with her grandmother.

Amber found the new school more challenging academically than her previous school, and she had difficulty keeping pace with her peers. However, she enjoyed the support of the school principal, who was beloved by the faculty, parents and students in this very small, rural, elementary school. Unfortunately, near the end of the year, her principal also died suddenly, throwing the entire school community into a state of uncertainty and grief. At the opening of the new school year, it was Amber's tribute to her principal—written with many misspellings—that was selected from the students' essays, to be read at the Convocation. It was subsequently reprinted in the local newspaper as follows:

> Our principal suffered a heart attack. He was the best! We all miss him but we know he still would want us to do our best. There will never be a principal like him. He worked hard and he wanted us to work hard too. We are all lost without him. He was a caring person who would do anything for us. I pray for him every

> night and I would do anything to get him back. (Amber's words, published in the local newspaper, September 6, 2006. The article was provided by another teacher at the school who saw Amber at the tutoring center when she brought her own son for tutoring.)

Amber had been in her present home environment for a year and a half at the onset of this study. She has removed the word "step" from all references to members of her family, as I shall through the remainder of this paper. She seems to enjoy a very close relationship with her mother and her sister, speaking of them with obvious pride and admiration. She adores her nephew, David (pseudonym), and provides lots of guidance and care when she is with him. During our times together, Amber would frequently call to my attention moments when David was particularly engaged with a story, or some other activity, commenting about how cute he looked or how much he seemed to be enjoying himself. The family has also supported Amber in facilitating on-going contact and visits with her grandmother.

Amber was recruited as a participant for this study through her family's knowledge of me and my tutoring center. Amber's mother managed a local restaurant where I often dined. Her family frequently spoke to me about Amber's frustration and difficulties in school. I offered to provide short-term tutoring as needed at no charge, but the family seemed to be reluctant, not wishing to impose. However, when I approached Amber's mother about the need for a participant in a study of word identification software and tutoring, she was eager to offer Amber this opportunity. Although she was concerned that it sometimes takes Amber a while to "warm-up" to strangers, she believed that as soon as a relationship could be established, Amber would be an eager and conscientious participant.

During June and July, prior to the onset of the study, Amber and David came to the tutoring center to meet me for the first time on June 19th, soon after my research prospectus had received approval. During the initial visit, we all met as a group, and the purpose of the visit was primarily social. Amber's mother left the children with me once they seemed comfortable, and Amber's sister joined us near the end of the visit to take the children back home. Much of the visit centered on my pet parrot, Zulu, who amazed the children with her remarkable ability to speak in different voices. I encouraged the children to write down the words they heard Zulu say, and I actively assisted David with letter formation and spelling using a primary writing slate to model each word as he wrote them on a primary writing tablet. Amber also took a sheet of primary writing paper and produced the following list of words: Marry, Chris, pretty bird, hello, you ready, [Amber's real name], and night night.

This initial visit was followed by two more joint visits prior to the end of June. Amber worked independently on the computer while I worked directly with David in the adjoining room. The following is the first document she produced independently:

> Hello I am amber robinson and I am going to the 5th grade. And I pasted my reading sol . And my family said I done great job and I can't wait until I Go to the 5th grade

On her next visit I took a picture and showed her how to insert it into her document. I also had her use TextHelp Read and Write™ concurrently with MicroSoft Word™ to afford her the options of text-to-speech and word prediction during her independent writing activities. The text of her second document follows:

> Hi I'm amber robinson and I am 11 years old. I have 3 dogs and 2 cats. my mom's name is Melissa robinson and my dad's name is bob robinson. My dog's name's are dueay stirt cevery . and my cat's name's is Senerkers and muffin. I love all my animal . my paners are my […]

As Amber began to work on revision of her second document, I coached her on the use of spell checking and grammar checking included in the MicroSoft Word™ program. I also showed her how to use the WordArt feature in the program for her title, and how to insert a photograph of herself into the document. Below is her final copy, with her photograph deleted:

Hi I'm Amber Robinson and I am 11 years old. I have 3 dogs and 2 cats.
my mom's name is Melissa Robinson and my dad's name is Bob Robinson. My dogs' names are Dewey, Stuart, Chevy, and my cats' names are Snickers and Muffin. I love all my animals .

These samples of Amber's work provide some indication of her level of performance prior to the onset of the study and her motivation to readily accept and implement suggestions. These visits also afforded her an opportunity to become more familiar with me, the setting, and the equipment prior to the study. Amber borrowed books for independent reading. She expressed that she was most concerned about her math and asked for extra work and some assistance in solving math problems involving all four basic math operations during these visits. She and David did not return until the end of July during their last week in summer school. Again, Amber used the computer independently in the adjoining room to visit a list of recommended websites suggested by her summer school teachers, while I worked with David on beginning reading and writing skills. I also assisted Amber with long division problems while David listened to a book on tape. Prior to beginning the study, I avoided working directly with Amber on her word identification and spelling skills. However, she was actively engaged in seeking help and using all available resources to improve her overall school performance.

Jane, the Tutor/Researcher

I am a retired teacher with over thirty years experience in public education. I have worked in a variety of settings including large and small school divisions in affluent and impoverished areas. I have also taught in children's psychiatric hospitals as a member of multidisciplinary clinical teams, consulted as part of a University Center for Excellence, and worked as the senior learning specialist in the Institute for Teaching Through Technology and Innovative Practices. My professional experiences have included teaching in self-contained classrooms for students with disabilities; collaborative team teaching in general education classes where students in special education were fully integrated; supervising special education programs for students preschool through age 22; consulting with professionals offering services to students with mild to moderate disabilities; establishing a community-based literacy program; and owning and operating a small, independent tutoring center. My bachelor's degree is in psychology from a program that concentrated on experimental methods in learning theory. My master's degree is in special education. I am endorsed in my home state to teach psychology, special education for students categorized as mentally retarded, emotionally disturbed, or learning disabled, and to supervise special education programs.

Shortly after formally retiring from public education, I decided to pursue my dream of doctoral study concentrating in the area of reading education because this was the area that presented such persistent challenges to those who experienced difficulties in my personal and professional life. While completing my coursework, I was employed as a graduate teaching assistant in the Department of Elementary and Social Studies Education. I also assisted students in the reading clinic as a volunteer in the Department of Language and Literacy Education.

My special areas of interest include supporting students of all ages who experience difficulties in acquiring literacy skills, preparing teachers to more effectively address the needs of diverse learners, and exploring how and under what circumstances technologies may enhance educational processes. These interests are rooted in my experiences as a child growing up with a parent who considered himself almost a nonreader, even though he engaged in meaningful work and provided well for our family. My interests have become passionate and more clearly focused through my personal challenges and professional experiences.

My theoretical perspective has evolved over the course of my professional life and is currently most closely aligned with the socio-cultural view. I now reject traditional concepts of disability and resist diagnostic practices used to determine disability. My goal is to facilitate the process of schools becoming more welcoming and enriching for all learners. I view learning as a process of change that may either facilitate or impede growth and achievement, depending largely upon the effects on one's motivation and personal sense of capability and competence. All students learn, and their personal judgments of their own capabilities and limitations are shaped, at least partially, by their academic performance in school. Focusing on abilities and possibilities is more likely to facilitate continual growth and increasing levels of motivation, while notions of disability and remediation are more likely to impede growth and discourage students.

I subscribe to an interactive, transactional model of reading, which incorporates a balance of bottom-up and top-down approaches. I also view reading and writing as highly interrelated and support the inclusion of both of these text-based activities in literacy lessons at all levels. I agree that individuals take different paths in developing literacy. Close attention to a student's prior knowledge, interests, values, motivations, and the student's own judgments of self-

competence and self-confidence are critical factors in guiding a student along a path to literacy. Although the level of challenge needs to be carefully considered before assigning independent work, strategies such as shared, paired, echo reading and guided reading can be used to scaffold more challenging experiences in order to increase the likelihood of success in pursuing personal interests. Word study should be balanced in equal measure with rich exposure to authentic texts and literacy experiences. Literacy acts are social acts of communication. Literacy lessons are best when they are active, social, playful, creative, and enjoyable with students talking, listening, and interacting with their teachers and with one another. Arts, sciences, and diverse cultural practices all enhance literacy lessons.

Even though I oppose regimented, skills-based instruction in which students are expected to complete piles of independent seatwork, I recognize that these practices are firmly entrenched in our schools and have been reinforced through recent school reform's emphasis on accountability. I try to support students in these skill-based activities by making the objectives to be accomplished as transparent as possible in an effort to help the student attain mastery quickly and with as little frustration as possible. My task as a tutor most often involves working with students to devise strategies and provide the support necessary for the student to learn the content and complete the required activities. My focus is on scaffolding student performance, so that the student does as much as possible and I offer whatever kinds of structure, support, or props necessary to facilitate successful task completion. These tutoring sessions usually result in improved grades and brief moments of pride in accomplishment, which provide partial relief or a brief reprieve for the student, but there is never sufficient time for students experiencing severe difficulties to meet all the demands and expectations placed on them during the school day.

Frequently, access to or continuation in general education classes in content areas is contingent on a student's ability to read and write well enough to be successful in the print-based curriculum privileged in schools. The prevalent view is that reading skills are foundational for learning and must be mastered for fluent reading, and that fluency is essential to reduce the cognitive load sufficiently for a student to focus on comprehension of texts. Even though I am not in complete agreement with this view, I wondered if explicit skills instruction through a software program designed specifically for older students, might improve accuracy and fluency in a student like Amber who has experienced gaps in her early reading instruction.

Research Site

The site of this case study was the small, independent tutoring center I owned and operated, located in a small town in the southeastern region of the United States. The tutoring center was located on the second floor of a 19th century hotel that had been renovated to accommodate several suites of offices. A heavy commercial door opened into the waiting area for the tutoring center. Two adjoining tutoring rooms open directly into the waiting area (Figure 3.1). The area was decorated to appeal to students of all ages. There were magazines, student authored books, projects, posters, games, educational toys, a talking globe, and many gifts from students such as wind chimes, sun catchers, and several figures of parrots. Many of the younger students had been given nominal amounts of money to purchase trade books from their schools' book fairs that they thought would interest other students. These books were arranged on side tables and each of these books had a note on the inside cover reading, "This book was carefully selected for Moving Up Learning Center by [student's name]. In the waiting area there was an AlphaSmart with a typing instruction book, and a note suggesting students could practice keyboarding when they had time. For parents and other adults, there were journals, literature

from the community college, notices about upcoming cultural events in the community, and a bulletin board where students were invited to post their pictures.

Figure 3.1. The waiting area.

The tutoring rooms themselves had wooden dining tables where students and tutors worked together. Often there was a tutor working individually with a student in each of the two rooms simultaneously. There was a computer hutch in the alcove in Figure 3.2 where Amber sat while using the computer in this study. She sat in the desk chair visible in the picture beside the printer and I sat slightly behind her on her right side.

Figure 3.2. The smaller tutoring room viewed from the waiting area doorway.

There was a pet parrot caged in the larger tutoring room (Figure 3.3). The parrot, Zulu, was a big attraction for students who came for tutoring and many of them brought their friends up to see Zulu and listen to her talk. Younger students would often read her stories or create writing samples about things the bird said or about imaginary escapades when she would escape from her cage. Zulu usually greeted students and often cheered when I praised students for their achievements. Sometimes, the bird became disruptive and a cover was placed over the cage causing the bird to get quiet and reduce the distraction. Throughout the study, there were intermittent faint sounds of the bird whistling and talking in the background as she was kept in

the next room. Amber enjoyed playing with the bird during her breaks and before and after each session. Zulu's presence seemed to be a source of comfort and entertainment for Amber.

Figure 3.3. A close-up of Zulu, the pet parrot.

The center is designed to provide a comfortable and interesting place for students to engage in academic activities that are designed to seem more home-like than school-like (Figure 3.4).

Figure 3.4. The larger tutoring room viewed from the waiting area doorway.

Procedures

Initially, a prospectus was developed and submitted to the University of Georgia Institutional Review Board for approval. Prior to beginning of the study, written consent was obtained from the parent and the student (See Appendix A). During these initial meetings strong preference was expressed by Amber and her parents that the study be concluded prior to the beginning of the new school year. They also offered the possibility of working seven days per week to match their work schedules.

At the end of each session, all the performance reports provided by the Lexia SOS™ software were printed out and stored by session in a large notebook for further analysis. Each

tape and CD was cataloged and stored in a cabinet and locked in my home office. The contents of the digital audio recorder were transferred to the laptop computer immediately after each of the sessions, and then the recorder was erased. Each day I recorded detailed field notes and reflected on the software, on Amber, on her response to the software, my own and Amber's reactions, and on the instructional decisions made as the study progressed (See Appendix B for an example).

Equipment

Audio and video recordings were made of all of the tutoring sessions and the assessment sessions, except the assessment session at the end of Phase 1 where only audio recordings were made because I noticed that Amber seemed to be avoiding the camera during the last session of Phase 1. She was quite congested and I suspected that may have been the reason she had avoided the camera at times. A Sony video digital video camera was attached to a tabletop tripod. For audio recordings I used a Sony digital recorder and a cassette recorder with an auxiliary table top omni-directional microphone. During the assessments the recording equipment was situated on the top of the bookcase to the right of the table in the smaller tutoring room in Figure 3.2.

During the tutoring sessions the software was presented on a Toshiba Qosmio laptop computer, equipped with a finger print authentication security device and a 17 inch diagonal display used with a Logitech wireless mouse. The video camera was situated on its stand just to the right of the computer. The tabletop microphone was placed next to the camera, but the cassette recorder remained on the bookshelf. There was a small digital timer placed on the hutch above the desktop. Behind Amber there was a printer attached to the computer to print reports immediately following each session. On the same computer, all video files were converted and compressed to MPEG files using *Sony Creative Software Vegas + DVD Production Suite 7.0*™.

Vegas 7.0 software was used to capture and compress the video tapes and copies were burned onto CDs.

Assessments Administered

A thorough individual assessment of the Amber's reading development was made prior to the onset of the study, at the conclusion of Phase 1, and at the conclusion of Phase 2. The assessments at the conclusion of Phase 1 and Phase 2 were collected on the same day as the concluding sessions of *Lexia SOS*™, separated by substantial breaks. These assessments were part of my personal collection of assessment instruments to provide a measure of her progress independent of the Lexia software program. Assessment data were used in determining the initial appropriate instructional units, and to be certain that she would have opportunities for new learning. Assessment data were primarily used to answer Question 2, "Were word recognition skills improved by use of Lexia Strategies for Older Students (SOS) ™ software alone without intervention on the part of the tutor/researcher?" and Question 3 "Was the student's rate of progress in word recognition increased using Lexia Strategies for Older Students (SOS) ™ software when there was interaction between the tutor/researcher and the student?" The assessment data consisted of the following assessment instruments used in this study in the following order:

1) *The Qualitative Reading Inventory-3* (QRI-3) (Leslie & Caldwell, 2001) consisted of graded word lists and graded passages ranging from pre-primer to high school level. Prior knowledge was assessed before reading each passage and the student was asked to make predictions. Comprehension was assessed using retelling, questioning, and looking back strategies. This instrument was selected for the availability of an assortment of passages on the level of Amber's grade

placement. I was familiar with the instrument, because I had used it previously, and I considered it versatile, yet comprehensive.

2) *The Informal Phonics Survey* (McKenna & Stahl, 2003) is a criterion-referenced measure intended to assess knowledge of letter sounds in isolation and in words. It yields precise information about use of phonetic skills. I selected this instrument to provide an indication of Amber's facility with decoding.
3) *The Fry Instant Word List* (McKenna & Stahl, 2003) is a list of 300 high-frequency words used to determine which sight words she could correctly identify in 30 seconds or less. This instrument assessed Amber's word recognition skills on high frequency sight words.
4) *The Elementary Qualitative Spelling Inventory* (McKenna & Stahl, 2003) assessed her level of word knowledge and spelling. The test consists of five sets of five words each with each set increasing in difficulty. Each word was presented orally, used in a sentence, and repeated.
5) *The Dynamic Indicators of Basic Early Literacy Skills* (DIBELS; Good & Kaminski, 2002) was also used as the instruments were quick and easy to administer, and they were used in many of the studies involving Lexia software to date. The Dibels Oral Reading Fluency (DORF) is a standardized, individually administered test of accuracy and fluency reading connected text. It can also yield a score for Word Use Fluency (WUF) by having the student re-tell what she has just read and counting the number of words used. Each of these tests can be administered in one minute. Since DIBELS was likely to be used at her school, and I had no other measure of her oral expression, I wanted to see how Amber

would perform on this commonly used assessment instrument and compare it with her performance on the other graded reading passages. The graded passages used were at the 5th grade level as she had passed the state assessments and would be using 5th grade texts and materials when school resumed.

Lexia Learning Systems Strategies for Older Students (SOS) ™ Software

Lexia SOS™, a computer software program for students ages 9 through adult, is designed to strengthen automatic word recognition skills using age-appropriate content and interface. It was conceived of as a supplement to an integrated language arts program that includes systematic work in oral language and reading comprehension, even though the publisher's website reports it has been effective as a stand-alone supplement to the overall language arts program. *Lexia SOS*™ is designed specifically for an older student who has yet to acquire automatic word recognition skills. Students struggling with word recognition tasks beyond the 3rd grade are unlikely to encounter formal instruction in these basic skills in their regular education classrooms. The *Lexia SOS*™ software could provide an extended opportunity to privately and independently develop skills associated with automatic word recognition, thus avoiding the embarrassment and fear of disclosure that often accompany skills-based remediation for older students in group settings.

Lexia SOS™ is divided into five levels, beginning with word attack skills necessary for the automatic recognition of short-vowel words of only one syllable and extending to structural analysis for automatic recognition of multi-syllabic words. It provides practice in applying word attack strategies to opportunities to read and respond to cloze passages in connected texts. The program provides immediate feedback to students, and it keeps track of all responses. It provides three different student report forms as well as bar graph depictions of progress through the levels

and current unit snapshots in a small pop-up window that indicates the current unit in the current activity. The program automatically branches based on student responses, but the administrator can override this feature as necessary.

It appeared that *Lexia SOS*™ could provide the phonics-based instruction Amber would need to successfully decode the nonsense syllables that had proven so troublesome for her. *Lexia SOS*™ features graphics and activities appropriate for an older student. The activities are arranged to reflect a logical progressive sequence of activities divided into five levels. Even though I was not successful in capturing screen shots from the software, there is a product demonstration available from: http://www.lexialearning.com/products/productsdemo.html .There is a chart that summarizes the student's movement through each of the five levels, and that presents a visual display of the student's progress. The contents of each level are described below:

Level 1 begins with "short vowel sounds" and "consonant sounds" focused on reinforcement of sound/symbol correspondence. Next the focus shifts to the letters "b, d, and p" to develop automatic recognition and association of the appropriate sound with these symbols. Then the focus shifts to "middle vowels" using medial short vowels in dictated one-syllable words and nonsense syllables. The final sequence of activities in Level 1 requires students to match "short vowel words" with pictures.

Level 2 begins with "letter switch," referring to activities designed to reinforce the sound/symbol correspondence for consonants, consonant blends and digraphs, short vowels, and long (silent-e) vowels. The next group of activities is labeled "short & long vowels," requiring automatic recognition of long and short vowels through auditory and visual discrimination tasks. The focus shifts to "sight words" next followed by two series of activities labeled "2 Syllable

Words I" in which the emphasis is on constructing and decoding two syllable words including long and short vowel sounds and applying these word attack strategies to reading in context.

Level 3 begins with activities involving sound/symbol correspondence for vowel combinations including "vowel digraphs" and "vowel-r" words. Other activities in Level 3 include focus on words with simple "suffixes," "2 syllable words II" involving construction of two syllable words by matching detached syllables, and "paragraphs I" involving reinforcement of word-attack strategies while reading words in paragraphs.

Level 4 activities first focus on "syllable types" involving reading of two-syllable words containing six syllable types, then "2 sounds of c & g", then "3 syllable words" consisting of practice in constructing three syllable words from five types of detached syllables, and finally, "paragraphs II" designed to continue reinforcing the use of these word-attack strategies by reading words in paragraphs.

Level 5 activities are designed to reinforce structural analysis strategies for automatic recognition of multi-syllabic words. The first groups of activities focus on "Anglo-Saxon" and "Latin" prefixes and suffixes in words containing two to four syllables. A section labeled "special accents" provides practice on recognition of words with special accent patterns. The next section focuses on "root meanings" and seeks to improve vocabulary and word recognition by study of words containing common Latin roots and prefixes related to number and negation. The final group of activities labeled "Greek" aims to improve vocabulary and word recognition by emphasizing the meanings of Greek combining forms.

The *Lexia SOS*™ software meets McKenna's (2002) list of desirable characteristics of good phonics software: Instruction is systematic and direct, facilitates teacher monitoring, helps children progress from alphabetic to orthographic decoding, employs onset-and-rime formats,

employs make-and-break activities, progresses from monosyllabic to multi-syllabic words, and maximizes time on task. Olson and Wise (2006) reported using Lexia Learning Systems early reading software programs in parts of their research, but they did not analyze its benefits separately from their own training programs. However, they noted favorable student reactions to the activities that explicitly teach basic grapheme-phoneme correspondences. *Lexia SOS*™ is available in a family edition, which is the full program with the number of users limited to three, at a vastly reduced price. Therefore, I had previously purchased the program used in this study without outside funding.

Phase 1

In Phase 1 each of the sessions took place on a separate day, but we worked for 12 consecutive days, coinciding with the family work schedule. Prior to the beginning of Session 6, I added a round mirror, six inches in diameter on the shelf above the computer so I could monitor Amber's reactions more closely. Amber completed 12 sessions using *Lexia SOS*™ while I monitored and made notes sitting slightly behind and off to her right side. At the end of Phase 1, the total time spent was computed by the *Lexia* software as 4 hours 56 minutes and 28 seconds, and the same amount of time was allotted for participation in Phase 2.

Phase 2

In response to the request from Amber and her parents to conclude the study prior to the opening of school, I proposed the possibility of completing two sessions each day with a substantial break of approximately two hours in between. This option was favored by all involved parties. During Phase 2 the student completed additional sessions of Lexia SOS™ software while engaged in interaction with me as I attempted to scaffold her performance by verbalizing the thinking processes (think-alouds) and providing language-based coaching. The

interaction was aimed at promoting success while reducing the risks associated with lack of progress.

Data Analyses

The efficacy of the *Lexia Strategies for Older Students (SOS)* ™ software was determined under two conditions: Phase 1- student working independently; Phase 2- tutor/researcher and student engaged in dialogue to maintain instruction in the student's zone of proximal development. Phase 1 would approximate a student working independently in the program, as it is frequently used and has been reported as producing significant improvement in some experimental studies. Phase 2 would more closely approximate use of the program as part of a balanced literacy program under the close supervision of a highly trained tutor.

Two separate quantitative analyses were performed on the data generated by the *Lexia SOS*™ software using an A-B research design, which is useful in determining the effectiveness of an intervention on targeted behaviors under specified conditions with the goal of ascertaining a functional relationship between the independent variable and each of the dependent variables (Sealander, 2004). An assumption underlying a functional relationship is that the dependent variable spurs a change only when the independent variable is introduced (Alberto & Troutman, 1999). This assumption appears to conflict with the assumption of ZPD underlying this case study. If the independent variable, the tutor/student interaction, was internalized by the student, then the cessation of interaction would not be expected to result in performance dropping back to the pre-intervention baseline. Therefore, an A-B research design was selected. In this study, Phase 1 established a baseline of the student's performance using the software without interacting with the tutor/researcher. Phase 2 was the intervention phase in which the

tutor/researcher and the student engaged in on-going interaction while the student used the software.

A graphic display of results is used for informing instructional decisions (Sealander, 2004). Statistical analyses are limited to measures of central tendency in each phase. In this case mean was used to indicate the mean of the percentage of correct responses, and the mean amount of time the student engaged with the software. The means under each condition cannot be subjected to tests for significance using a single-subject design because this would violate a basic assumption of t-tests or F-tests, the assumption that the data points are independent of one another.

The first dependent variable was the task duration per session to provide an indication of the student's level of motivation, because she was permitted to extend or end a session within broad parameters of ¼ -1.0 hours. Previous studies indicated that Lexia products are motivating to students (Faux, 2004; Kutz, 2005; Marsh, 1995), but in some studies the software was not as motivating as expected (Clarfield, 2006; Faux, 2004). The task persistence would be expected to increase during the interaction in Phase II because student engagement and scaffolded performance are characteristics of ZPD.

The second dependent variable, the percentage of correct responses, was also expected to increase when the tutor was able to scaffold performance in the ZPD. The length of the study was expected to consist of 24 sessions, because Kutz (2005) found this duration sufficient to produce significant change. However, the actual number of sessions was determined by the student in this study because the total time spent in Phase 1 was matched in Phase 2.

In both phases, if the student did not appear to be sufficiently challenged to hold her interests, or if the student seemed too frustrated to make forward progress through the levels of

the program, the tutor could override the usual sequence and advance her to activities requiring different skills on the same level. Because participation was completely voluntary and the student could request to be dropped from the study at any time, adjustments were made whenever the tutor/researcher or the student judged the material to be inappropriate or if continuing in the activities was not in the student's best interests.

Both quantitative and qualitative data were collected in this study. All materials were analyzed, coded, and triangulated throughout the course of the study. Qualitative data included my observation notes, field notes following each session, and critical reflection on my practice, in order to compare it to previous research findings regarding effective tutoring practices and to take stock of Amber's responses to my tutoring actions following each session in Phase 2. These video files were then moved into *Transana 2.20* (See Figure 3.5) where each session's sound track was transcribed and time codes were inserted to allow the transcription to align with the video. *Transana* allowed me to highlight a section of the transcript and review that precise section of the video. I also used *Transana* to code each session, organize codes into collections, and review video clips and their associated transcripts for each code, or for each collection. *Transana* also recorded precise time markings for the beginning, ending, and duration of each video clip. These features permitted me to analyze the frequency of errors, associate emotional tones with key events during each session, and carefully study my own practice and the immediate consequences, if any, of each interaction. Digital audio and video recordings were moved into *Transana* to capture verbal interactions, subsequently transcribed, and coded.

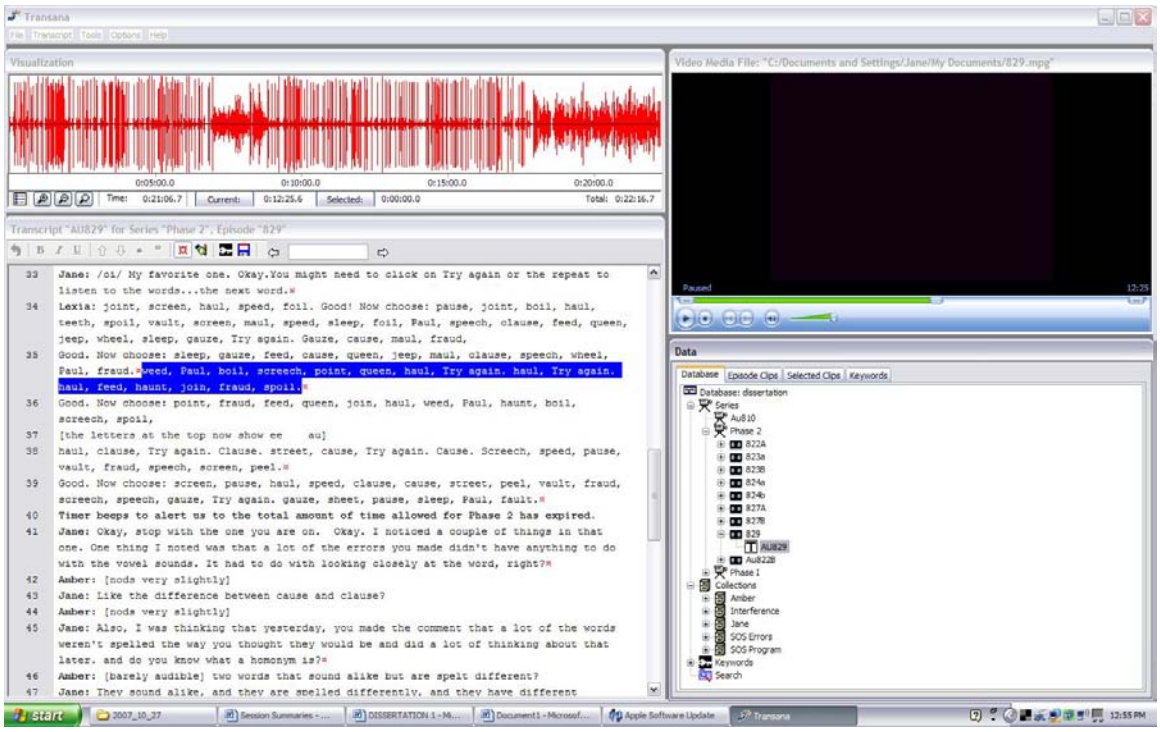

Figure 3.5. Screen shot of Transana 2.20 in use with video blackened out

My assistance, which I call tutor moves, was guided by the analysis of processes reported in the Cromley and Azevedo (2005) study of what reading tutors do in naturalistic studies. The coding classified my actions into the following four broad categories identified as "tutor moves" (p. 87): 1) instruction, 2) cognitive scaffolds, 3) motivational scaffolding, and 4) tutor questioning. Later, I added the contents of my hand-coding of tutor moves, additional codes for each of my tutor moves, and coded each of these as ZPD positive when Amber was successful in responding to the next task, or ZPD negative when she erred on the next task item.

Video recordings provided a view of Amber's face during all sessions and also included my face during Phase 2 when the interaction was occurring. These video recordings were reviewed and coded to assist in the analysis of Amber's speech, both social and private, in order to identify indications of mediated action. Video clips were marked to identify excerpts indicative of private speech. The analysis of student speech was guided by the *Private Speech*

Coding Manual available at http://classweb.gmu.edu/awinsler/Resources/PsCodingManual.pdf (Winsler et al., 2005). Open coding was included whenever there appeared to be something of significance occurring that did not fall under one of the existing codes. For a complete listing of the codes used, see Appendix D.

Lexia SOS™ provided detailed reports including dates of sessions, units attempted, duration of sessions, content presented, repetitions required, and performance data for each skill addressed during the session. This material was analyzed to compare Amber's performance during Phase 1 with her performance during Phase 2, and provided partial data for answering research questions 2 and 3. However, it was unclear how Lexia evaluated her performance and what served as the bases for their analyses because I could not determine the scope and sequence of the tasks from the Lexia reports. Also, there were frequent discrepancies between the reports and all my other sources of data.

I used the *Lexia* Student Report to determine the activities and the number of units of each that Amber completed. (Then, by using my notes, and working through the *Lexia SOS*™ software, the transcripts and video recordings in *Transana,* which were all open on my computer at once so I could shift from one to the other to constantly compare each of the data sources, I reconstructed all of the events that transpired over the approximately 10 hours that Amber used the *Lexia* program.) I used each response that Amber recorded as the unit of analysis. I recorded my data in a *Microsoft Excel*® spreadsheet from which I produced the summary material in Appendix G: Task and Performance Analyses of *Lexia SOS*™ Activities.

This process involved reviewing the video recordings many times in their entireties, while studying the transcripts. When I found errors in my transcriptions or interpretations, I made corrections. When I found other incidents where Amber's actions or expressions had been

overlooked, I coded them. I added many bracketed descriptions to my transcripts with each one linked to specific video clips within the context of the entire session. Because *Transana* permits nested collections, many events recorded are coded for Amber, Jane, and the Lexia software to study the part each played in the overall interaction. As new codes were required, they were included. When the coding designation did not seem to fit, it was changed to a more descriptive term. (The final version was recorded in Appendix D.)

Finally, other data considered included field notes made after each contact. This data included my reflections on my practice, artifacts, school records supplied by the family, and member checks with Amber and her family. As the video of each session was reviewed along with the coded video-clips, and the field notes were read and considered along with any other data or information deemed pertinent, a written summary of each session was prepared. From the constant comparison (Eisenhardt, 1989) of all the data described above, I wrote the session synopses presented in Chapter 4.

To answer Question 1: "What indications were there that the interactions between the tutor/researcher and the student established and sustained learning in the student's zone of proximal development on word recognition tasks?" I used all of the data collected to some extent. However, the codes in *Transana* were most helpful, for I was able to study these in any way I needed. For instance, I could view all the codes recorded during a particular session with the sections of transcripts applying to each code, or I could pull all the instances where I found evidence of a particular action (for example, private speech) across all of the sessions. This capability allowed me to check my emerging understandings to confirm the patterns I thought I detected and to study the actual part each of the participants played in the interaction, within the context of the events occurring in the Lexia program.

In answering the second question, “Were word recognition skills improved by use of Lexia Strategies for Older Students (SOS) ™ software alone without intervention on the part of the tutor/researcher?” I primarily used the assessment data. However, I could not avoid considering the qualitative data when considering the value of using the software without interaction with a tutor. Amber experienced substantial frustration considering the minimal gains she made in just a few areas.

The final question, “Was the student’s rate of progress in word recognition increased using *Lexia Strategies for Older Students (SOS)* ™ software when there was interaction between the tutor/researcher and the student?” was also answered primarily using the comparative assessment data along with observations recorded with each assessment.

CHAPTER 4

SYNOPSES OF SESSIONS IN PHASE 1 AND 2

A synopsis of each session was created using daily written summaries, written reflections on my practice, notes from each session, member checks with Amber and occasionally other family members, video and audio recordings, session transcripts, and Lexia reports. These synopses provide a context for the analyses in subsequent chapters. Through these synopses I summarized what occurred with regard to Amber's attitude and behavior while she used the *Lexia SOS*™ program to improve her word identification. Each synopsis begins and ends with a few details about interactions between Amber and me. Keep in mind that in Phase 1, I did not act as a tutor mediating Amber's learning with the Lexia program (except as noted) whereas in Phase 2 that was my role.

An overview of the structure underlying the Lexia software program is essential for understanding Amber's progression through the program.

- The software is divided into five levels, although Amber worked only on the first three levels.
- Each of the levels 1-3 is divided into five activity groupings, with a descriptive name (i. e., Short Vowel Sounds).
- Each of the activity groupings is divided into units. Units were assigned sequential numbers within each activity group.
- When Amber exhausted all the practice sets available in the Lexia database, practice sets previously provided were presented again. They were referenced as the "# repeats," and

the total number of practice sets completed in an activity was referenced as the "# Uses" in the *Lexia Strategies for Older Students: Use Report*. A circle, filled in with yellow, indicated that Amber had difficulties within an activity that were unresolved and would therefore require additional support. There is a button labeled "i" for information on each screen that supplies the name of the activity, the unit number, the total number of units, and the number of repeats within each activity.

- There is a report available to the administrator, entitled *Strategies for Older Students: Student Report*, which details the student's progress. There is also a visual bar graph provided to the student before and after each session depicting progress made in each activity on the student's current level.

In the booklet accompanying the *Lexia SOS*™ software, the administrator is advised that the program will branch (i.e. advance) as appropriate to meet the student's needs. I interpreted this to mean the program will advance to the next unit when a student has reached some performance criteria, and until that criteria is reached, the program will present additional exercises (which I will refer to as practice sets). I found that the software usually provided another practice set when two or more items were missed, though this was inconsistent. There was no explanation of the criteria used in any of the accompanying materials, even though the *Student Report* provided a performance range on specific sub-skills for some units (i.e., 75%-89% for short /a/ sound). Because there was no further explanation provided to the administrator about the branching process, *Lexia's* criteria for progression had to be inferred. On many occasions Lexia provided additional practice when Amber had not erred two or more times, and her percentage of correct responses was observed to be 80% or above. This may be an issue with the software that, over time, was a source of frustration for Amber and me.

I numbered each of the practice sets, to aid in tracking the items comprising each one and the skills sequence. For example, in Unit 1, Amber had three practice sets featuring the distinction between the short /a/ and the short /i/ vowel sounds; I labeled these practice sets, 1.1, 1.2, and 1.3. Advancement to the next unit or activity is called branching. Sometimes the activity was simplified when Amber had difficulty. For instance, Amber was provided an initial practice set requiring distinction among the short /a/, /i/, and /o/ vowel sounds. When she had difficulty on the initial practice set the task was modified so she was asked to distinguish between only two vowel sounds, the short /a/ and the short /o/. Then she was asked to distinguish among the short /a/, /i/, and /o/ vowel sounds again. Because she was successful on this task, she advanced to the next unit. When I report her time spent in each session in these synopses, note that it is based on the time codes from my video recordings, rather than on the Lexia reports.

Phase 1 Session Synopses

Session 1. August 9, 2007. Activity: Level 1 Short Vowel Sounds,Units 1-7 of 7

Amber seemed excited about starting her sessions. She called about 15 minutes before I was due to arrive to be sure I was still coming. During the drive, Amber asked if she had spelled any of the words correctly on the pre-assessment. I assured her that she had spelled quite a few of them correctly and that she had done well with those "tests" overall. I shared my belief that her difficulties were due to missing some specific elements of instruction during the primary grades in school, thus promoting the idea that by "filling in some holes in the instruction she had received," this experience could help her improve her performance in reading.

The pre-assessment indicated a need for review based on difficulties with some consonant sounds (/b/, /n/, /g/, /z/, /x/, /qu/, /n/, /ch/, /sp/, and /tw/) on the *Informal Phonics Survey* (McKenna & Stahl, 2003). Since consonant sounds were the focus of the second activity

in Level 1, we started at the beginning of the *Lexia SOS*™ software. Since there was no indication of difficulty with short vowel sounds on the pre-assessment, this beginning point was intended to present initial tasks on or below her instructional level. However, short vowel sounds presented in *Lexia SOS*™ proved to be more difficult than expected. This discrepancy between Amber's performance on the pre-assessment and her performance of the *Lexia SOS*™ tasks may have been due to differences in the nature of the tasks required. On the pre-assessment, words were presented visually, requiring Amber to read words containing the targeted vowel sounds. However, in *Lexia SOS*™, she was usually required to match vowel sounds presented aurally with their visual symbols, which she found more challenging.

The first set of activities consisted of seven units. The first of these units required Amber to focus on two key words on the screen: "apple" for the short /a/ sound and "igloo" for the short /i/ sound. Both words were matched to pictures. The Lexia voice delivered ten words with either a short /a/ or /i/ sound. For example, one of the words was "inch" and Amber's task was to click on the word "igloo" because inch and igloo both record the short /i/ sound. When Amber made two or more errors, Lexia would usually provide additional practice sets of ten words. Across the seven units, she was able to advance after the first practice set on two of the units. On the other five units, Lexia supplied three to five practice sets. On two occasions, the line of yellow dots appeared, but as a reminder I did not provide any instruction because this occurred during Phase 1 of the study.

All the units on short vowel sounds used real words (in later units nonsense words are also used). Twice the Lexia software interpreted delayed responses as errors. About 11 minutes into the session Amber's errors began accumulating and other signs of frustration appeared, including agitation, chewing and sucking on her lip, and immediately repeating the same error (3

times). She also smoothed her hair, took both hands and squeezed her cheeks, and then stroked her cheek with her fingertips.

While I packed up, Amber visited a website called primarygames.com, which turned out to be a website to improve academic skills. She completed all the levels without exhibiting any of the frustrations she had with Lexia. Then she cleaned, organized, and arranged anything in the Center that appeared out of place, making everything sparkle! I interpreted her actions to mean that she liked coming to the Center and was eager to make this her special place. She seemed to relish her role in helping me become a better teacher, as she became a better student. Though she had reported earlier that she felt a lot of stress regarding her school performance, she said she was looking forward to getting back in school in the fall and doing well.

Session 2. August 10, 2007. Activity: Level 1 Consonant Sounds, Units 1-13 of 19

When I picked Amber up, she seemed eager to see me. She had a long scratch along the side of her face that she said her nephew had inflicted deliberately. I encouraged her to tell her mother how it happened. I was becoming her coach on social matters as we chatted and sipped cold sodas to combat the 100°+ heat.

The first six units in today's session dealt with beginning consonant sounds. The task was to click on the correct initial consonant to complete each word pronounced. For example, the letters 'h,' 'j,' 'k,' 'f,' and 'v' were displayed on the screen. The Lexia voice said "vet." Amber responding by clicking on the 'v.' After the program presented all the words in the unit, they were all displayed together. Amber was instructed to click on each word as it was pronounced by the Lexia voice.

Amber completed all six units, erring only on the word, "zip." Amber had no difficulty with the /b/, /n/, /g,/ and /v/ sounds presented in the initial position in a short word, whereas she

had erred when they were presented in isolation on the pre-assessment. The letters, ‘x’ and ‘q’ were not addressed in the Lexia program, but the /z/ sound was troublesome both in the pre-assessment and in the Lexia exercises.

Amber found units seven through ten more challenging units that involved consonant blends and digraphs as initial sounds. On the pre-assessment, she experienced difficulty with /ch/ presented in isolation, had no trouble when the Lexia program presented /ch/ as the initial sound, but erred when the /ch/ sound was in the final position, missing the words, “much,” “such,” and “which.” Of the 13 units covered in this session, she was able to complete 10 of the units with no more than one error. The other three units required three to ten practice sets, which involved consonant sounds in combination in the initial or final position. Although Amber made only two errors involving the /fl/ and /bl/ blends in the initial position, she made 21 errors identifying /sh/, /ch/, /ck/, /pt/, and /ft/ consonant blends or digraphs in the final position.

Evidence of her anxiety and frustration mounted, beginning after 18 minutes. Amber tended to slow down following an error, subsequently repeating the same error or making several additional errors in rapid succession. She covered her face with her hands, breathed deeply, sighed, smoothed her hair, rocked in her chair, and fingered her clothing. Once, when she heard the Lexia voice say, “Try again,” she rolled her eyes, shook her head mouthing “no,” crossed her arms across her chest suggesting a “I give up” demeanor, and wiggled in her chair. After 22 minutes, she stomped her foot, and after 28 minutes she twisted her hair and rocked as she made multiple errors in rapid succession while identifying final consonant sounds.

She worked for 41 minutes. The number of practice sets exceeded the number available in the Lexia database, resulting in repetition of some of the same practice sets. There were four of these repeats reported in the *Lexia Strategies for Older Students Use Report*. The series of

yellow dots appeared indicating the need for assistance from me, but because it was Phase 1, I resisted the urge to provide assistance.

On the drive home, Amber shared the disappointment she felt with her performance and her fear that she would "mess up" the study. I assured her that "messing up" this study was impossible, and that some activities would be easier. I also expressed my appreciation for her participation and patience, and I explained that I could not assist her in Phase 1 but assured her that I would be assisting her in Phase 2. Because Amber's family members worked many weekends, leaving Amber and her nephew, David, with a sitter, we scheduled a session for Saturday morning. I promised to take her out for a nice lunch afterward.

Session 3. August 11, 2007. Activity: Level 1 Consonant Sounds,Units 13.5-19 of 19

I picked Amber up at 8:30 a.m. and she had not eaten, so we stopped off at the new *Sonic* restaurant and chuckled as we watched new employees learn to roller skate while she ate breakfast. When we stopped off at the local *Walmart* for some supplies, she selected a folder for her nephew and a planner for herself. She eagerly entered our appointments and my contact information into her planner.

During this session, she completed the one additional practice set from the previous session and the remaining six units in the *Consonant Sounds* activity in the same formats. This time she was to select the consonant sound to replace the blank in forming nonsense words pronounced by the Lexia voice. Some examples included "mas," "lish," "nect," and "plun." Then all the nonsense words in the unit were displayed, and she had to click on each nonsense word as it was pronounced by the Lexia voice. Amber completed two of the units with no more than a single error. On the other four units, she made two errors out of twenty attempts on the first presentation of each unit, but she was provided two additional practice sets on only two of these

units. On the other two units, the Lexia program failed to add additional practice sets even though she had made two to three errors. Also, when she branched beyond the *Consonant Sounds* activity, all traces of the yellow dots disappeared from the reports, making it less likely that a tutor could identify and revisit troublesome areas outside the Lexia sessions.

Twenty-three minutes into the session indications of mounting anxiety reappeared; she rubbed her clothing, stuck out her tongue, rubbed her face, and engaged in lots of scratching and stretching. The program scored an error when Amber hesitated for 20 seconds because her response time was too slow. At the conclusion of the *Consonant Sounds* activity, Amber indicated that she would like to stop the first instance she was offered an opportunity to do so.

She seemed eager to go to lunch even though it had been only a couple of hours since she had eaten her breakfast sandwich. I suspect that her curiosity rather than her hunger led her to remind me of my promise that we would eat lunch at a nice restaurant. I had not eaten, and building trust is important, so I followed through on my promise of the previous day. While I finished my closing activities, she spent a very brief period on the Internet at primarygames.com and organizing things around the Center. She truly seemed to enjoy the more upscale restaurant as she had never been there before.

Amber indicated that the adults would also be working on Sunday if we wanted to meet again. Of course I was eager to complete the data collection prior to the opening of school as her mother had requested, so I told her I would be happy to work with her, but I emphasized that I didn't want to tire her out on it. She assured me that she loved to come. I detected that she was a little reluctant to leave her nephew and she confirmed that there was some rivalry involved in the scratching incident earlier. Also, the elderly couple who normally looked after them would not be available. I proposed that if she decided to work with me on Sunday and if her family agreed,

I would take her and her nephew out to a local resort where there is indoor swimming, bowling, and other games afterward. She was ecstatic.

I liked the comfortable relationship that was forming between us, but I did not want to shower her with gifts and social activities. Hence, I made it clear that we were doing this because she was kind enough to work with me through the weekend while her family was struggling to balance childcare with work schedules. This extended work period helped me to complete data collection before she returned to school.

Session 4. August 12, 2007. Activity: Level 1 B,d, & P, Units 1-16 of 16

I picked up Amber and her nephew, David. My husband entertained David at the park while Amber worked with the Lexia program. Both the children seemed very excited about our plans afterward.

During this session, the task was to distinguish between the letters or letter sounds /b/, /d/, and /p/ positioned at the beginning or end of real words or nonsense words. There were 16 units: some required her to click and drag each word, presented visually, to one of three boxes labeled "b," "d," or "p," while others required her to click on "b," "d," or "p," in response to words spoken by the Lexia voice.

Amber completed 14 of the 16 units on the first practice set. She was working quickly and made two errors that appeared to be due to her rapid pace, causing two additional practice loops to be provided. In Unit 4, she erred on the word, "bin." When she heard Lexia say, "Try again," she moved her hands to her lips in a playful exaggeration of her response to missing an item. I noticed Amber devising a strategy in Unit 5 on the task of sorting each word to one of the boxes labeled "b," "d," or "p." The words, presented visually, had the targeted letter in the final position. Amber dragged each word over close to the box for close visual comparison before

dragging it into the box. On two occasions, she got too close to unintended boxes as she dragged the words, which the program scored as errors. In Units 10 and 13, Amber erred on the words, "bust" and "crab." Her difficulty may have been due to the pronunciation of the words by the Lexia voice. I suppose that regional dialectic differences and lack of context caused these errors.

When Amber completed Unit 16, she stretched and declined my invitation to begin the activities involving middle vowels. She had only been working with Lexia for 20 minutes. However, when I suggested we stop since she had completed a whole activity in record time, she seemed relieved and eager to get on with the fun day we had planned. During the outing she seemed a little subdued at times, yet very appreciative and animated as she recounted her day when we returned to meet her family.

Session 5. August 13, 2007. Activity: Level 1 Middle Vowels, Units 1-4 of 12

I noticed that Amber was exceptionally quiet when I picked her up, which I found surprising since she was so appreciative and bubbly when we had parted the afternoon before. She did not feel well and explained that her throat hurt when she talked, so she was very quiet. Before we began using Lexia, Amber eagerly helped with hole-punching for the assembly of a manual as we visited with another student whose tutor was delayed.

As the session began with a game-like activity, Amber was humming softly with a pleasant, intent expression on her face. Her task was to identify and click on the middle vowel sound in three and four letter words. For example, the word "lap" was pronounced by the Lexia voice. There were three empty squares at the top of the screen indicating the placement of the letters in the word. A star traveled across the screen toward a draw bridge, which was open. Amber's task was to click on either the /a/ or the /i/. She was sitting up straight and her eyes were tracking the progression of the star as she made her choices. The correct response caused

the bridge to come down and provide the star passage; in contrast, an incorrect response caused the star to fall through the opening into a trap. The correct spelling of the word appeared in the three boxes across the top before the next word was introduced. The first practice set of each new unit was in this game-like format, but additional sets required her to click on the medial vowel sound as each word was presented aurally by the Lexia voice. When she clicked on the correct letter sound, the word would appear in the boxes near the top of the screen. There was a repeat button Amber could click to hear a word again.

Amber found this activity very challenging and completed only four units. Words were dictated in groups of 14. The first unit required distinguishing between the short /a/ and /i/ sounds. She required four practice sets, missing “fib,” “lap,” “bid,” and “nag.” The initial practice set of Unit 2 involved the distinction among the short vowel sounds /a/, /i/, and /o/. In Unit 3 the distinction shifted to the short vowel sounds /i/, /e/, and /u/ in the game-like format. Amber missed “bid” twice in rapid succession. Unit 4, which required distinction among four short vowel sounds in the medial position in words, also posed difficulties. She missed the word, “sung,” two times in rapid succession, and two additional times before completing this unit, usually adding /i/ instead of /u/. I noted that Amber made frequent errors in her speech with verb tenses, so this factor may have contributed. We ended the session after approximately 22 minutes.

After making errors just over seven minutes into the session, she became very restless, scratching, stretching, coughing, dropping her hand down on the desktop, and sipping her Gatorade. There were also signs of fatigue such as hesitations, yawning, and propping her head up with her hand with her forearm braced on the desktop. The yellow dots signaled the need for

assistance that could not be provided in Phase 1, as she required nine practice sets to complete the unit.

As I watched the video later, I realized Amber was feeling poorly, and her cough was growing deeper. Had I known, I would have stopped the session earlier. Amber expressed concern about her performance on the way home. I explained that she was not expected to complete so much in such a short period of time. She also said she was afraid she would mess up my study! I assured her that she was doing fine. Her spirits seem to lift when I told her that the resource teacher from her school would be in the Center tutoring another student during our next session. She was quite fond of this teacher and seemed eager to see her again.

Session 6. August 14, 2007. Activity: Level 1 Middle Vowels, Units 5-6 of 12

Amber still reported she did not feel well and she was uncharacteristically quiet. Though Amber preferred to work early in the day, we had postponed our session until late afternoon due to a medical appointment. Amber listened to country music during the drive. Upon arrival, I got a small make-up mirror about six inches in diameter and placed it on the shelf above the computer so that I would be able to monitor her general demeanor as she worked. Amber and I adjusted it together so I could get a glimpse of her as she worked. She seemed to enjoy the mirror when she found that she could get a glimpse of my face as well.

Amber went right to work on the *Middle Vowels* activity. In sets of 14 words, the Lexia voice would pronounce each of the words in turn. Amber's task was to distinguish among the medial /a/, /i/, /o/, /e/, and /u/ sounds in words consisting of four letters. Each unit began in the game format with the drawbridge and trap described in detail earlier in Session 5. The game format was suspended when Amber completed the remaining seven practice sets required to complete the unit. However, it appeared she should have advanced after only four of these sets as

she made no errors on two consecutive practice sets, but instead, she completed three more practice sets before advancing to the next unit. Amber erred when she selected the /e/ instead of the /a/ in the word, “snag.” Her other errors in this unit involved the medial /i/ and the medial /e/ sounds. The words she missed were “spit,” “fist” (twice in rapid succession and one additional time), “stem,” “shed,” “spin,” and “limp.” Amber spent about 13 minutes on this unit.

In Unit 6 the task required Amber to distinguish between the /a/ and the /i/ sounds in the medial position using practice sets of 14 three-letter nonsense words. Amber misidentified the medial vowel sound six nonsense words: “vin,” “rad,” “vit,” “bal,” “rab,” and “hab.” In addition, the nonsense words “hin” and “val” were each missed twice, in different practice sets.

Amber completed only two units in this session, ending her work after about 22 minutes. She was chewing gum during this session and at times she would attempt to blow a bubble by sticking her tongue out through a glob of yellow gum. She appeared to be less certain of her choices, clicking on the repeat button more often, and the gum chewing becoming more vigorous. My notes reported very vigorous gum chewing whenever she made errors. Overall, the intensity of her gum chewing was most apparent during the last sets of Unit 5 and the beginning of Unit 6. Other than the chewing, the only indication of anxiety building was one incidence of scratching when she worked with nonsense words. Fatigue was also noted during this last unit, evidenced by Amber’s shrugging her shoulders and propping her chin on her hand. As Unit 6 came to an end, Amber asked to be excused to go to the restroom, so we decided to stop there.

Amber seemed disappointed with her slow progress. When she returned from the restroom, she spoke briefly with her teacher, who asked her what she was working on. Amber told her we were doing research and looked to me. I assured Amber she could share whatever she wanted. When her teacher gently probed for more information, she chose not to elaborate on our

work together. On the drive home I told her that she was doing well, and I reminded her that the things in this session had been especially difficult for her in the past, yet she was making progress. In scheduling our next session, Amber asked me to pick her up at 8:00 a.m. so she could "get it over with." When I asked if she dreaded coming or felt relieved when the sessions ended, she explained that she liked to get things done early so she could get on with the rest of her day.

Session 7. August 15, 2007. Activity: Level 1 Middle Vowels, Units 7-8 of 12

Amber was quiet again on this date as she listened to the radio, which limited our interaction during the car ride. Her hair was usually shiny and fresh, but on this day it appeared to be oily. Upon arrival, she got herself a soft drink and went on the Internet to play primary games while I cleaned the parrot's cage. She seemed to enjoy playing math games aimed at strengthening her facility with basic facts while she talked to the bird from its perch outside her cage. Generally, she appeared content, but not particularly eager to begin working with the Lexia program.

The activity featured selection of the appropriate medial vowel sounds in 14 nonsense words spoken by the Lexia voice. We terminated the session after Amber required nine practice sets on Unit 7, and then 11 practice sets in Unit 8 without advancing. It appeared that nonsense words with medial /o/ or medial /u/ sounds were the most difficult for her.

I had placed a small mirror on the shelf above the computer, attempting to monitor indications of mounting anxiety and frustration. Amber managed to hide her discomfort from me until near the end of the session. She covered her face with her arms, stretched, and moved very close to the computer screen, avoiding the camera lens and the mirror. Later I realized that Amber wiped a tear just over three minutes into the session when the Lexia voice indicated

another practice set. She responded to only three more nonsense words correctly, and then wiped the tear on the nonsense word, “non.” At this point, she had made only two errors. There were other issues in her family during this time, and she was still coughing frequently, so it is possible her tears were unrelated to the session. However, medial vowel sounds in nonsense syllables were causing her lots of difficulty. While her tolerance for frustration may have been reduced due to other concerns, she found this session very stressful.

The camera footage was disturbing when I reviewed it. Six minutes into the session her gum chewing became noticeably more vigorous. She appeared to be chewing on her beautifully manicured nails and on her necklace. She was coughing frequently. By eight minutes into the session, she seemed to have regained her composure. But at 11 minutes, and again at about 26 minutes into the session, she dropped her hand down heavily on the desktop upon hearing the *Lexia* voice say, “Try again.” At about 19 minutes into the session, she mimicked the *Lexia* voice when she heard the words, “Practice with these letters will help.” I realized that she was not advancing, but was reluctant to stop her because she would have to repeat Unit 8 when she resumed her sessions. Also, I was aware I was not supposed to interact or intervene during Phase 1. However, when I thought I saw a tear trickle down her cheek, I stopped the session immediately. She had been working for 29 minutes. Amber had advanced only from Unit 7 to Unit 8 during this session, and the report of her performance revealed that she had experienced 11 repetitions of practice sets! (Note that repetitions refer to practice sets repeated after exhausting those practice sets pre-programmed into the software.) The yellow dots had appeared early in the session and remained throughout.

I talked with Amber immediately after the session, but she seemed unable to speak. She nodded her head, agreeing that this section had become too hard and too frustrating for her. I

assured her that attaining skill in a single skill area, such as short vowel sounds used in pretend words, is not so important for someone who reads as well as she does. I shared that I also had difficulty hearing the nonsense words correctly when they were spoken by the Lexia voice. She seemed to be surprised and gave me a weak smile. I assured her that her becoming a good reader did not depend on success with nonsense words, and promised her I would find another option so she would not have to repeat this section. Because there was so little progress for so much effort, I decided to move her past this activity. I did not think it was ethical to leave her in such a frustrating situation when I was not supposed to provide assistance during Phase 1.

Session 8. August 16, 2008. Activity: Level 1 Short Vowel Words, Units 1-9 of 9

Prior to this session, Amber and I went for lunch at the new *Sonic* restaurant. She had been so frustrated the day before that I felt beginning the day with something pleasurable was the best course of action. I set a playful tone, and she picked up on it. I pondered returning to the medial vowel activity when she entered Phase 2, but I decided to move ahead. We were both laughing and joking as the session began.

The *Short Vowel Words* activity consisted of nine units. She completed all nine units in about 20 minutes without requiring any additional practice sets. The units began with Lexia presenting five words and five pictures. Amber's task was to match the word with its picture, click on the word, and then the picture. The second task was to complete the same matches arranged in different order and complete them in less time. The third task involved looking at a picture and clicking on the phrase that described the picture. For example, there was a picture of a glass jug on its side with a mud puddle inside. The choices, presented visually, were: "mud in a jug," "a vet in a bus," "a bug in a net," a tub in a jug," and "a bud in a hut."

While the timed segments did not appear to have any effect on the scoring, Amber seemed to enjoy trying to increase her speed. She worked quickly and efficiently. But when the activity became more complex, as the content shifted to words with consonant blends and digraphs in the final position, she became slightly fidgety, opening and closing her hand held just under her chin several times in one minute. Near the end of the session, Amber missed only one item when the head and neck of a giraffe were pictured with highlighting over the neck. I don't think she understood that the highlighting meant that the picture was to be matched with the word, "neck."

This session seemed to be important to Amber in rebuilding her confidence and sense of self-efficacy while using the *Lexia SOS*™ program. She ended the session smiling, laughing, and nodding her head in agreement with my compliments, "Wow! You finished a whole level that time! What do you think? Are you feeling better?"

At the end of this session, she advanced to Level 2. When she saw the topics, she said, "Ugghhhh!" I asked her what scared her, and she responded, "A lot!" Then she said, "Can I ask you a question?" When I agreed, she asked, "So when you push the green button does that count for a unit? At that time, neither of us had a clear understanding of the structure of the *Lexia SOS* program. I replied that I thought so, but the "New Unit" sign did not always come up. I did my best to explain how the program worked, but admitted to her that I was not certain. I asked if she wanted to continue in the study, and she nodded affirmatively. As we turned off Lexia for the day, she smiled and waved, saying "Bye-Bye!" I interpret her questions at the conclusion of this session to mark a critical point in her assuming responsibility for her own learning. I had noted some strategic moves on her part in previous sessions, such as using the repeat button to compare the prompt to her choice or moving a word over next to the box for comparison before she made

her final selection. However, her question this time seemed to indicate that she recognized this program had a definite structure that she wanted to understand better so that she could monitor and evaluate her own progress.

Session 9. August 17, 2008. Activity: Level 2, Letter Switch, Units 1-6 of 22

Amber had not eaten, so we started our time together with lunch. Amber chatted easily and was critical of the repetitive nature of the Lexia program, and about being tired of hearing the Lexia voice say, “Try again,” or “Practice with these letters (or words) will help.” Amber went straight to the computer when we arrived, adjusted her chair, the camera angle, the mirror while making faces at her reflection, and finally popped a peppermint into her mouth.

The *Letter Switch* activities began with squares containing a three letter word. There was a box in the lower half of the screen containing single letters and the Lexia voice said, “Change wig to fig.” Amber had to click on the letter, ‘f,’ in the lower box, then click on the ‘w’ in the word, “wig.” Then, “fig” occupied the space for the three letter word. As she spelled each word, it appeared at the top of the screen where all the words presented remained throughout the activity.

The next activity featured the original word and the seven transformations as a result of the letter switching with each displayed in one of eight boxes across the screen. The Lexia voice said, “Choose pit.” Amber clicked on the correct word.

On Unit 3 the activity changed. This time there was a sentence in a long box across the center of the screen. For example, the first sentence was only presented visually, “The mad dog b_t his leg.” The letters, ‘a,’ ‘e,’ ‘i,’ ‘o,’ ‘u’ were spread across the bottom of the screen. Amber’s task was to click on the letter ‘i’, and then click on the blank to be filled. There were eight sentences.

These formats described above in the first three practice sets were repeated throughout the *Letter Switch* units, with each unit adding some small degree of complexity. For example, the next task required Amber to switch the vowels to change words beginning and ending with consonant blends or digraphs.

Amber successfully completed three of these units on the first practice set, and two to three practice sets to complete the other units. Words she found difficult included "hit," "pit" (which required three tries as she selected the 'o,' then 'u,' and finally 'i'), "slam," "sled," "rang," "rung," "sing," and "sang" ("sang" required four tries.). Before she made the correct choice on "sang," the correct choice and the letter she was to replace turned pink, so they stood out from the other choices, but Amber did not seem to notice as she made another incorrect choice. On the sentence, "With a __ap, the puck went in the net," Amber selected 'tr' for the blank, then 'br,' and finally 'sl'. We ended the session at this point, so Amber had to complete two additional practice loops at the beginning of her next session.

Amber had spells of coughing, and as the material became more difficult, she frequently hesitated before answering and pushed the repeat button to hear the word again, sometimes more than once. Evidence of mounting anxiety included scratching, stretching, wringing her hands, fingering her ear, wiping her face, touching her lips, fingering her teeth, and placing her finger in her mouth. Amber stamped her foot in frustration when this session was interrupted by phone calls. Then, as she erred on "rang," Amber slapped her hand down on the desktop. This session lasted 33 minutes. Even though there was a lot of tension, Amber seemed to put it aside shortly after we finished.

Session10. August 18, 2008. Activity: Level 2 Letter Switch, Units 6.2-10 of 22

I picked Amber up at 8:00 a.m. because she was leaving at noon on a family trip. She met me with an assortment of her art work and sought my help and resources to display them as gifts. The emotional tone was different, and she seemed more child-like and required lots of attention. She shared an intricate drawing of a court room, on which she had inserted a note that said when she grew up; she wanted to be a lawyer. It had two small errors, which I helped her to correct. Because the edges of her drawing were tattered, I helped her glue the drawing to a piece of tag board, smoothing out the tears. Because she couldn't decide who she most wanted to receive this special picture, I scanned it and provided her with prints. Although she was usually very efficient and autonomous, on this date it seemed that the more I helped her, the more she wanted to accomplish. Amber spent a few minutes adjusting her seat and making faces at the mirror and video camera as I set a timer to ensure her return home by the requested time.

The units in this session continued in the same formats described previously for the *Letter Switch* activity. The first two exercises required her to spell words to complete the sentences in Unit 6. These activities involved consonant blends and digraphs, though Lexia made no distinction between consonant blends, digraphs, diphthongs, or clusters. Three of the units required her to click on single consonant or consonant combinations to change the targeted word into another word spoken by the Lexia voice. Another unit required her to chose the appropriate letter or consonant sound ('nt,' 'ng,' 'st,' 'nk,' 'e,' 'u,' 'i,' 'a') to spell the words needed to complete each sentence. Amber was able to complete three of the units on the first practice set, but another unit required a total of three practice sets. She also required several attempts to spell the words "track," "sank," "tick," and "slick."

On one occasion, Amber was to change the word “tent” to “tint.” Amber assumed the program had locked up and whirled around to look at me with a wrinkled brow and a disgruntled look. These two words are pronounced identically in this region. Amber restarted the program. When she returned to this task, she whipped around to look at me and said, “That again!” This time I heard the difference, but she was still convinced that the program was malfunctioning, so I told her the Lexia voice was saying two different words. I said, “They are saying ‘tint,’ like you color paint.” Amber still did not respond. Later, I learned that the word, “tint,” was not in her oral vocabulary. So she could continue, I provided a huge hint by saying, “It has the word, ‘in,’ in it.” She had difficulty again when she was asked to select “tent” and “tint” from the list of all the words.

During this session, Amber coughed, yawned, and rubbed her eyes frequently. While there were small signs of increasing restlessness, I saw little to indicate mounting anxiety. I stopped the session after 30 minutes so that I could drive her home before noon. Amber was rather quiet during the drive, but she mentioned that the Lexia program was unfair to use two words that were pronounced the same way, an issue she brought up on several occasions. These events appeared to contribute to Amber’s growing distrust of the Lexia program. When she encountered difficulties in this session, I did not see the same high level of frustration as I had in past sessions. Perhaps she was beginning to attribute some of her difficulties to shortcomings of the Lexia program, rather than blaming herself for her difficulties.

Session 11. August 19, 2007. Activity: Level 2 Letter Switch, Units 11-14 of 22

I had agreed to pick up Amber and her nephew up at 8:00 a.m. because they had no other child care arrangement. When I arrived, I learned that they had traveled home very early in the morning to open the restaurant by 6:00 a.m. Amber seemed a little reserved today, and it

appeared that she was not feeling very well. She had a thick cough, and she seemed tired after getting up so early to travel.

Amber continued working on the *Letter Switch* units in the same formats described previously, which involved slightly more complex words in each unit. The first unit involved changing consonant sounds (/fl/, /tr/, /dr/, /st/, /mp/, /ck/, /nk/, /th/) to spell the words needed to complete sentences presented visually, one at a time. Amber was able to complete all the units except one by working through only the initial practice set, making no more than one error in each unit. Unit 14 required a total of three practice sets when she had to change one word to another by adding a silent-e. She made several errors, particularly when she had to change "slop" to "slope." Other errors involved the words "stamp" and "pile." We ended this session in just over 15 minutes because she was not feeling well and we had other plans.

Amber asked if I would use this program to help David. I was surprised because I did not think she had a high opinion of Lexia. I asked if she thought it would help him, and she replied that it really seemed to be helping her and that it might help him, too.

Session 12. August 20, 2007. Activity: Level 2 Letter Switch, Units 15-20 of 22

Amber had a very deep cough with lots of congestion. She mentioned that her coughing had caused her to be awake most of the night. Even though she was polite and cooperative, we were unusually quiet during the drive to the Center. Again, Amber's oily hair was probably an indication of how tired and ill she felt, for her hair was almost always freshly washed.

She continued working through the *Letter Switch* units in the same formats described previously in detail. Units 15 and 18 involved using single letters and consonant blends or digraphs to spell words situated in sentences correctly. Units 16, 17, and 19 involved substituting

single letters, consonant blends, or groups of letters offered for parts of targeted words to transform one word into another. Units 19-20 used nonsense words.

Amber was able to complete three units with no more than one error, working through only the initial practice sets. However, the two units involving application of the closed versus silent-e vowel pattern, each required three practice sets. In one unit, she required three trials to correctly complete this sentence: “Is it best to __ipe or grin?” Her responses were “scrape,” then “scrap,” and finally “gripe.” Although her pattern of errors was difficult to interpret here, I suspect that the word, “gripe,” was not in her oral vocabulary. The program assumes vocabulary knowledge whereas the tutor can mediate when the student lacks prior knowledge. I planned to make sure Amber was aware of vocabulary during Phase 2. The session ended after 25 minutes.

There were indications of mounting tension and frustration beginning about half way through this session. On one occasion, when Amber heard the Lexia voice say these words, “Practice with these words will help,” she rolled her eyes up to the ceiling and began repeating them in a mocking manner under her breath. There were also very long hesitations when she appeared to be concentrating intently prior to choosing her response. Restlessness and fatigue were indicated when Amber bent her head back, appearing to stretch her neck, and then rose from her seat and readjusted herself. It appeared that her coughing and congestion were becoming more troublesome when she moved her head close to the screen, thus avoiding the camera lens. She also wiped her face and nose with her hand, sniffled, sipped some Gatorade, coughed, and mopped her brow with her hand.

Amber and I went out for a nice lunch to celebrate the end of Phase 1 and to give her an opportunity for some free time and rest before we completed the second assessment later in the afternoon. While she was polite and cooperative, the coughing and congestion seemed to be

taking a toll on her. Later in the evening her mother called and said they would be traveling to a neighboring state to care for her grandmother who was sick, so we would not be able to meet. I felt relieved she would have some time off to get well and rest, but I was also anxious that we may not be able to complete data collection prior to her school's opening.

[This concluded Phase 1, which consisted of twelve sessions of approximately 20-30 minutes each. This number of sessions and session lengths were based on previous studies using Lexia programs. However, Amber was given the final decision about when to end each session in this study. A timer was used to stop Phase 2 to equalize approximately the total time spent in each phase.]

Phase 2 Session Synopses

Session 13. August 22, 2007a.m. Activity: Level 2 Letter Switch, Units 21-22 of 22 and Activity: Level 2 Short and Long Vowels Units 1-6 of 27

When I picked up Amber, she told me that her day had begun at 3:00 a.m. We did little talking as Amber seemed to be napping in the car. As this session began, I asked Amber "to talk out loud" about what she was thinking, so I could help her better. She asked for gum, and I suspected her gum chewing, evident throughout this session, might have helped her stay awake.

This session opened with the last two units of the *Letter Switch* activity, in the same formats as before, but involved changing vowels in nonsense words as spoken by the Lexia voice. She was able to complete these two units with only one practice set each. Amber's "thinking aloud" was not as extensive as I wanted. She responded at a very low volume, using a few words or a single letter, to describe her proposed action. I asked Amber to repeat her first response twice before I could understand her. After three more responses using abbreviated verbal communication, she hesitated for several seconds, and then slapped her hand down on the desktop without responding. I asked, "What did she [the *Lexia* voice] say?" intending this

question to serve as a cognitive prompt. She slapped her hand down on the desk, harder this time, and pursed her lips together.

I was having difficulty deciding how often to provide instructional assistance because her actions indicated I might be contributing to her frustration, so I held back and watched for definite indications that she was having difficulty making choices. Just prior to beginning the second activity on *Short and Long Vowels,* I provided a mini-lesson on how the silent-e rule usually makes the first vowel record the long vowel sound.

Amber's task was to click on either "Closed" or "Silent-e" for words spoken by the Lexia voice. There was a brief explanation of the difference between closed syllables and how silent-e in the final position in a word signals a long vowel sound for the first vowel. Amber was able to complete this unit with two practice sets, erring on the words, "sip" and "maze."

The next unit addressed the same skill using a different response format. A blue 5x5 table constituting a maze, appeared with a large, dark blue dot in the box in the upper left corner. The word, "pin," was in the box to the immediate right; and the word, "pine," was in the box immediately below the dark blue dot. The Lexia voice said, "Choose the word that you hear….Pine." The task involved choosing words to proceed through the maze as each word was pronounced. A yellow arrow appeared to indicate the exit point.

Unit 3 also used the same blue grid. However, instead of words there were question marks. Her task was to select the vowel(s) needed to spell the word spoken by the Lexia voice. All of the target words were formed by using the closed or silent-e vowel pattern. After a correct response, Amber chose a question mark to progress through the maze toward a yellow exit arrow. This activity confused both of us because we did not understand how selecting the question marks related to moving through the maze, or connected to the closed/silent-e task.

After only two errors involving “fake” and “nip,” Amber leapt up out of her chair. I assumed that we did not hear the instructions, so we restarted the program. Lexia returned her to the last practice loop, so I continued coaching Amber through hesitations, and errors. She erred only on the word “kite.”

Unit 4 also focused on closed and silent-e words. Amber erred on “rod,” “dim,” “sip,” and “jog” before she hesitated on “code.” I said, “Do you hear the vowel?” I pronounced the word twice, elongating the vowel sound. I asked, “Do you hear the vowel say its name?” Amber responded correctly but turned her head away from me and the camera. When I viewed the video later, I could see that she had started to cry. She correctly categorized the next four words without any assistance from me. On a practice loop continuing with the closed and silent-e format, she was able to correctly categorize 17 out of the 20 words, but when she missed, “rip,” the video revealed that she slapped herself on the forehead, pushed on her brow, and wiped her eyes.

This session was disturbing because Amber appeared to be sad and disgusted with herself as a result of her difficulties distinguishing long and short vowel sounds when words were spoken by the Lexia voice. I was also having trouble timing my interventions appropriately. On several occasions, just as I began offering support, she clicked on the wrong choice. When I voiced my concerns to Amber afterwards, she seemed to avoid the discussion, so we switched topics.

Session 14. August 22, 2007 p.m. Activity: Level 2 Short & Long Vowel Sounds, Units 5-12 of 27.

After a quick lunch, we went shopping for her mother’s birthday present. This provided for a two hour break. We had agreed, with her mother’s input, to do two sessions per day in Phase 2, in order to complete the data collection before school opened. Amber seemed to recover

somewhat during the break, but she was undoubtedly very tired as her day had begun at 3:00 a.m. As the session opened, Amber was smiling and appeared relaxed. She seemed to approach her session with renewed vigor, even though she had begun to cough.

Amber completed the unit in the maze with the question marks format, on the first practice set with no errors. It seemed that Amber now understood how to complete the maze by choosing question marks that led to the yellow exit arrow, but she soon randomly clicked on the question marks without regard to the yellow arrow pointing to the exit point, thus trapping herself twice in the maze. During the last part of this session, Amber appeared to be tired and sounded congested. Hesitations were frequent, but I coached her, and she exercised caution to avoid additional practice sets. She frequently blew her nose, and at times her eyes would droop as she yawned and stretched. She made no verbal responses other than to answer my direct questions as I tried to support her performance with guiding questions and prompts. She worked for 30 minutes.

I noticed the sequence of an error, mounting frustration, and finally some expression of anger, several times during this session. She expressed uncertainty over a response by loudly sucking in air with her tongue slightly protruding, while squinting one eye. As I transcribed the video later, I chuckled at Amber's ugly scowl when the Lexia voice said, "Try again." She erred almost immediately and shifted her eyes back and forth from side to side and glanced in the mirror for my reaction. I was pleased to see her responding negatively to the program, rather than turning her anger and frustration on herself.

Session 15. August 23, 2007 a.m. Activity: Level 2 Short & Long Vowels, Units 13-16 of 27

Amber appeared tired and her eye was irritated when I picked her up for our morning session. She was unusually quiet this morning, and when I commented on it, she reported that she had not slept well due to frequent coughing.

The first unit continued the practice distinguishing between closed syllable and silent-e words. The difference was now the words presented began with a consonant blend or digraph (e.g. slim versus slime or grim versus grime). It took Amber five practice loops to complete this unit. In the second practice loop, I coached Amber through about half of the words. Once, when I said, "Okay," meaning "let's move on" she erred, and shot me a look in the mirror that I interpreted as disgust. I did not provide coaching on the fourth practice loop, to avoid her irritation or over-dependence. When she missed the first word, "shade," tears formed in her eyes. She correctly identified the next six words, before misclassifying the word, "stripe." This time she began to bite her lower lip. However, she responded to the next eight words correctly before missing the next two words, "crime" and "slam." On the fifth practice set, I coached her whenever she hesitated or became restless, coaching her on about half of the words. The last unit was in the maze with the question marks format and required four practice sets. She erred on "slum," "slid," and "flute." I noticed that she usually could select the correct word if she had the words presented visually, but was more inconsistent when the words were presented aurally by the Lexia voice.

On reviewing the video, I could see that Amber's eyes traveled up to look at me whenever she made an error. At the end of the first practice set, I asked if there were anything more I might do that would help her sort words more accurately. Even though I received no verbal response, I noted she was wringing her hands. She began pulling on her T-shirt and

putting the neck of her shirt in her mouth. When I asked her to identify the vowel sound, she spoke indistinctly and made a sound that seemed to be a combination of both the long and short vowel sounds. I began to ask if it were like “mad,” (the exemplar printed on the box under “Closed”) or “made” (the exemplar printed on the box under “Silent-e”). There appeared to be tears in her eyes as she slipped her hand under her T-shirt and used it to wipe her nose. She had been working for about half an hour when she asked to be excused. When I noticed a tear trickle down her face, I determined it was time to move on to another activity because continued practice was not leading to sustained improvement. I feared she would choose to discontinue the study if it meant enduring eleven more units of *Short and Long Vowels*!

Session 16. August 23, 2007 p.m. Activity: Level II Sight Words, Units 1-5 of 20

Amber and I returned from a leisurely lunch, and I gave her some time to use the Internet and follow her own interests. When it was time for us to continue, I used the voice recorder to record a chat with her because I had noted that she avoided the video camera when she was emotional. I explained that she had experienced difficulties in the past using the Lexia software, but she had worked hard and seemed to always make progress. However, this time I was concerned that the *Short and Long Vowels* activity was too frustrating, as we still did not fully understand the maze task with question marks, and it was taking up too much time. I assured her that given time, I was confident she could get through this unit as well. However, I favored her moving ahead to the next activity becauseI hoped we would get to read some of the stories later in Level II. I left the final decision to her, and I was relieved that she chose to move ahead. As we started the *Sight Words* activity, she also seemed relieved and more confident.

Each unit targeted three sight words, and consisted of word searches and practice spelling these words. With my coaching, Amber decided to select the letter “o” as the easiest to spot in

the word search array of letters and to use that letter to locate the word she was seeking. However, this did not help because Amber clicked on the letter “o” first. Then she was informed that she had to click on the letters from left to right, in the correct order. She made several errors, all due to clicking on the letters out of order as she searched for each word. She said she enjoyed typing the words on the keyboard in the spelling portion of each unit.

Amber completed the first five units, and the first practice set of Unit 6. Based on previous assessments, none of the sight words targeted had been problematic for Amber. We ended the session after half an hour. I was inclined to move Amber ahead again at the end of the session, because the program had only targeted 18 words of two to four letters, and the emphasis was on spelling. However, she spoke about how much she enjoyed responding by typing instead of clicking the mouse, and she was pleased with the number of units she had completed in this session. Considering all the frustration she had experienced with some of the other activities, I decided to continue with the sight word activities for one more session.

Session 17. August 24, 2007 a.m. Activity: Level 2 Sight Words, Units 6-12 of 20and Level 2 Two Syllable Words I, Units 1-3 of 15

Amber seemed a little more confident, open, and relaxed on this date. She told me about a family crisis that had been on-going since before we began the study that was finally resolving. She seemed a little embarrassed that there were problems in her family, so I shared that I had experienced a similar situation in my own family. I also let her know I was happy things were returning to normal for her at home.

Initially today Amber continued in the *Sight Words* activity. A close review and comparison of the transcripts reveal that Lexia started her on Unit 5, although the Lexia *Student Report* from the previous session shows she successfully completed these units. The same format

of finding the words on the letter grid, and then typing the words using the keyboard, continued. Amber was able to complete each of the units on the first practice set, with only two errors recorded during the session, which both occurred when she clicked on the letter grid on a letter other than the initial letter first. This activity required about 25 minutes of her time. Because there were no indications of difficulty with sight words, I urged her to move on to the next activity.

The *Two Syllable Words I* activity (there was a *Two Syllable Words II* activity that she did not reach during this study) involved the construction of two-syllable closed and silent-e words. The first unit shows a 3x3 table with a purple square in the center. The eight squares around the outside of the table were each imprinted with a syllable, either beginning or ending with a hyphen. For example, one of the outer squares has “gal-” and another has “-lop.” Amber’s task was to click on “gal-,” then click in the column labeled “1st”; next click on the “-lop” syllable, and click on the column labeled “2nd.” The second part of the unit presented the 3x3 table with the purple square in the center. However, this time each of the outer squares had a question mark. Now Amber had to click on each of the question marks to find the matching syllables in order to form four of the eight words from the previous task. Then she had to repeat the task on the next question mark grid to form the remaining words from the previous task. Each time the two question marks did not form a word, the Lexia voice said, “Try again.”

Amber completed two of the 15 units without any errors in the *Two Syllable Words I* activity. However, the task involving the question marks was disturbing as the Lexia voice would use the same response it had used to indicate an error previously. This was very disconcerting to Amber, who stretched and scowled when she heard, “Try again.” When we stopped at the end of the second unit, Amber questioned me further to be sure these responses would not be scored as

errors. I showed her the *Student Report* on this section where no errors were recorded. I decided to move her to the next activity because it took time to complete each practice set and it appeared to be disconcerting. I was also eager for her to have more of an opportunity to engage with connected texts.

Session 18. August 24 p.m. Activity: Level 2 Sentences and Paragraphs, Units 1-11 of 20

Between the sessions, Amber convinced me to return to her favorite place in town for chicken fingers. I generally resist this restaurant because the tables are usually sticky with grease. We enjoyed lots of laughs because on this date, the napkins and other things kept sticking to the table and had to be peeled off. We returned in the afternoon after more than a two-hour lunch break, feeling playful and light-hearted. Amber reiterated her concern that all the "try again" statements in the "memory- match" portion of the previous session might count against her, so we moved on to the *Sentences and Paragraphs* activity.

The first unit featured a cloze passage consisting of two sentences describing a picture. The sentences were made up of two to four letter words, and there was only one blank to be filled in. All the word choices were three letter words featuring the short vowel sound. There was a yellow box in the corner containing the words "the" and "cool," which she could click on to hear them read aloud. It appears that these are the only words in the passage that could not be decoded using the "closed" vowel sound or the "silent-e" rule. In this first example, there was a cat sitting on the end of a bed just inside a window, looking out on a desert scene with a cactus and a bright sun. A fan on the window sill was blowing on the cat. The passage read, "The sun made the cat hot. The fan will cool the _____ on the bed." Choices for filling the blank are "sat," "cat," "sun," and "fan." Amber's task was to click on the word of her choice, and then click on the blank. Then the Lexia voice told her to read the story to herself. However, I directed

her to read the passages aloud during this activity so I could better help her. Amber completed 11 of these passages, 10 on the first attempt, with only two errors.

Several passages were made more difficult because Amber lacked prior knowledge of the topic. One of the passages included this sentence: “She stole a chunk of honey from the bee hive. The choices were “live,” “chunk,” and “hive” for these two blanks. Amber initially chose “live” instead of “chunk.” With my coaching, she was able to select “chunk” as the only choice that could possibly make sense. However, in talking with her further, I learned that she had only seen honey in a jar in the grocery store, and the idea of getting a “chunk” of honey did not seem possible. She was able to accomplish this task easily after a brief mini-lesson on how bees store honey in a wax cone to constitute the bee hive.

Her lack of topic specific background information and her tendency to add endings to words played a large part in her having to repeat one of the passages about recycling. The first sentence was, “Do you ____ people would save _____ to use again. The choices were “trash,” “tramp,” and “wish.” Immediately, she chose “trash” for the second blank. I assisted her with decoding all the choices, noting that she added “es” to read wish as wishes. In her rural area, people did not save trash, and there was no recycling program. Even after correctly reading the words she had difficulty, substituted more familiar words for some of the words in the text, and chose less familiar words for blanks.

Amber and I both seemed to enjoy the interaction as she frequently giggled and broke into full-dimpled smiles, particularly during the first few passages. I noted her growing agitation, stretching, and scratching, that appeared in all of the passages where the context was less familiar. In the last part of this session, I began to allow Amber long periods of hesitation, asking

if she wanted assistance before coaching. We ended this session after about 40 minutes. She appeared tired, but pleased with her performance.

Session 19. August 27 a.m. Activity: Level 2 Sentences and Paragraphs, Units 12-17 of 20

We had taken the entire weekend off when Amber's family hosted a reunion. We chuckled about the way the sun filtered through the blinds and combined with the fluorescent lighting, which cast a greenish tint on everything. This playful tone continued throughout the session, even though she took the work very seriously.

In this session, Amber completed six units on the initial presentation and made few errors. The passages were continuing to lengthen and become more complex. Whole paragraphs were presented at one time with the cloze choices across the bottom. The passages increased in length with each unit, and the choices were less obvious. The nature of our interaction changed during this session. Amber hesitated, and she would usually decode many of the words on her own. When she needed help, she actively sought assistance. Usually when I would ask if she were stuck, she would point out a particular word or sentence. However, on the last passage, Amber became more agitated, played with her hair, and sipped her drink. After a long hesitation, I finally asked if she were stuck. She nodded, "yes" so I asked, "Where?" Amber read, "He was up in the sky. This was…" I asked her to point out the word she needed, and she replied, "I'm not stuck on one. There is just too much stuff." At this point I guided her through the passage sentence by sentence. It was apparent that the subject was hang gliding, a sport she had never heard of before. Her whole demeanor changed and she appeared to recoil when she read that someone was jumping off a cliff in the text. After I briefly explained hang gliding, she was able to read the passage fluently.

Amber seemed a little somber immediately following this session. I had noted her yawning and sniffling on occasion throughout this session, but she had experienced no significant difficulties while she worked. She had been working just under 40 minutes.

Session 20: August 27, 2007p.m. Activity: Level 2 Sentences & Paragraphs, Units 18-20 of 20 and Activity: Level 3 Vowel Digraphs, Units 1-6 of 26

Our two-hour lunch break included a little shopping. Amber returned to the Center in a very pleasant frame of mind and was eager to finish the tasks. The afternoon session began with a continuation of cloze passages. Each of the units consisted of a single paragraph with each one presenting a little more challenge. Amber made one error in the first passage, because she failed to consider all the alternatives before making her choice to fill in the blank. She substituted "help" for "take" in the sentence, "Jill will take people up the river in a raft to fish in a lake."

On one unit, she had trouble with the program not accepting her efforts to insert the correct word in the blank. Due to this problem, along with one other error that seemed to be due to working too quickly, she had to repeat the unit. I couldn't be sure whether the program actually malfunctioned and did not give her credit for the correct response, or whether she did not select the word she intended. In any case, she took more time repeating a short unit due to two errors. She seemed unaffected by this problem as she was certain it was a glitch in the program and not due to her actions.

Amber worked through these units with a confident attitude, and actively engaged in selecting the correct responses. She initiated interaction with me when she wasn't sure of a word meaning. A very small amount of our interaction dealt with applying phonetic rules to decode words. This kind of assistance was only provided twice during these last three units of *Sentences and Paragraphs*, and one of these was initiated by Amber when she wanted to know what

"roomps" meant, mispronouncing the word, "romps." Amber was quite animated as she laughed and made faces during this session. After she had selected the correct choices for the blanks, she read fluently.

When she completed the *Sentences and Paragraphs* activity and was informed she had advanced to Level 3, she was not pleased. She wanted more paragraphs like those we had been doing. Reluctantly, she agreed to continue, and the new activity was entitled *Vowel Digraphs*, which Lexia described as "sound/symbol correspondence for vowel pairs."

On the first unit, the vowel pairs "ai" and "ee" were in yellow boxes at the top of the screen and modeled their associated sounds when Amber clicked on them. They were also located in a box in the middle of the screen. As the Lexia voice said, "jeep", "J__p" and "sp__d" appeared on the screen. Amber's task was to click on the "ee" letter combination, and then click on the blank in "J<u>ee</u>p." Twelve words were presented in this manner, before they all appeared on the screen together, and Amber's task was to click on each word as it was pronounced.

Amber completed six of these units on the first practice set, and her playful approach continued. When she hesitated, I pointed out that she could click on the vowel combinations in the yellow box to hear the sounds repeated. As she clicked on each of the vowel combinations, I asked what she noticed. She replied that they only said the name of the first letter. I shared the phonics generalization that "when two vowels go walking, the first one does the talking, and it usually says its name." Amber looked up at the ceiling as if trying to remember, and then smiled.

When she made an occasional error, we laughed together as she made corrections. She showed some signs of fatigue by stretching and arranging her hair, but mostly she was playful, expressive, and actively seeking interaction. For example, when she heard "roach," she shuddered. As she reached the end of each unit, she asked if I wanted her to continue. I gave

answers like, “you can if you want,” and she moved ahead into the next unit. On at least one occasion in the video I noted that she opened her mouth wide and inserted her finger as if to gag herself during the *Vowel Digraphs* activity as an expression of her displeasure with this activity. When I told her we needed to stop after working almost forty minutes, she said, “Why so soon?” in a child-like voice and laughed.

Session 21: August 29, 2007 A. Activity: Level 3 Vowel Digraphs, Units *7-9 of 26*

This was the last session and we knew it would be comparatively short and had set a timer to end at the correct time. Amber was a little somber today, and I wondered if she had ambivalent feelings about our work together coming to an end.

The remaining units continued using the same format of the Lexia voice pronouncing a word, as Amber filled in the missing vowel combinations. Then, she had to click on each word as it was pronounced. She completed the first two units on the first practice set and she missed no more than one word per unit. She made errors on the words “throat” and “stray.”

The *Lexia SOS*™ program failed to offer any indication that this unit would also include vowel diphthongs, digraphs, and other vowel pairs that were neither diphthongs nor digraphs. Vowel combinations in this session included /oi/, /ay/, /ee/, /oy/, /oa/, /igh/, /aw/, /oy/, /ay/, /au/, /oi/, /ee/. Even though I reminded Amber that she could click on the letters at the top to hear the sounds again whenever she wished, she had a great deal of difficulty with words containing “au.” Amber missed “vault,” “maul,” “gauze,” “haul,” “clause,” and “cause.” The /au/ sound was introduced in the last unit, in combination with /oi/ and /ee/ presented in previous units. Amber had more difficulty with the final unit and required four practice sets of 20 words each before we had to stop to avoid exceeding the time spent in Phase 1. Because she did not have an opportunity to complete this unit, we had little opportunity for additional coaching.

There were indications of anxiety building as she returned to her pattern of making errors in rapid succession, and she demonstrated increased agitation accompanied by stretching and yawning. She seemed very tired after this relatively short session and very eager to have the study over! We had worked on the *Vowel Digraphs* activity for only about 15 minutes.

CHAPTER 5

ANALYSIS OF TUTORING IN THE ZONE OF PROXIMAL DEVELOPMENT

This chapter is about the research question: "What indications are there that the interactions between the researcher (me) and the student (Amber) establish and sustain learning in the student's zone of proximal development (ZPD) on word recognition tasks?" Empirically studying the ZPD requires an analysis of what is observable during tutoring. It is difficult to identify the ZPD because it is a dynamic process that can only be inferred from the interactions between the tutor and the tutee that enable the tutee to perform tasks that she cannot perform independently. First, I begin with an analysis of the ZPD events when I offered various forms of assistance aimed at situating the ZPD. Next, I analyze the sessions and activities to determine factors that are indicative of construction of the tutee's ZPD. I consider the assistance required to scaffold her performance and whether the content offered an appropriate level of challenge. Other indicators of learning in the ZPD involved analyses of the nature and extent of Amber's participation in the interaction, her verbal and nonverbal actions, her affective state, and observable indications of internalization. Finally, I offer major insights based on my analyses.

Operationalizing and Analyzing the ZPD Events

First, to operationalize the ZPD I identified all the places in Phase 2 when I interacted with Amber to assist her with a word identification task in *Lexia*. To find these events of tutoring assistance, I read all the session transcripts and watched the accompanying videos. I also relied upon reports generated by the *Lexia* program about Amber's performance on each word identification activity. I marked an action as a ZPD event when there was evidence that I, as the

tutor, took some action to assist Amber. The ZPD event ended when Amber made either a correct or incorrect choice on whatever task was on the computer screen after my tutorial assistance.

Second, I used the software program *Transana* to code 109 ZPD events across the nine sessions in Phase 2. The 109 segments of ZPD events were coded as positive when Amber chose the correct response (ZPD+) or negative when she chose an incorrect (ZPD-) response.

Third, I used a five column chart to record information for each ZPD event. The first column contained reference information for the location of the event in the transcript, whether the event was ZPD+ or ZPD-, and information about what prompted me to provide assistance (hesitations, errors, emotions, reading miscues). The second column was for specifics of the assistance provided. The third column was for details about the content of the learning task. The fourth column was about Amber's response (cognitive, affective, or executive) to my tutor moves. The fifth and final column was for any other notes that seemed important to me. A sample of the coding and notes sheet I used is included in Appendix E.

Fourth, I used the notes from within the column on tutor moves to more specifically classify what I did within the ZPD event. I found that my actions ranged from simple to complex and sometimes involved numerous tutor moves. Eventually I arrived at four broad categories: *Cognitive Support, Instructional Support, Emotional Support, and Empowerment Support* (See Appendix F).

Cognitive Support refers to my actions aimed at having an impact on Amber's thinking about reading word tasks. Guiding prompts refer to questions or short phrases that I hoped would be internalized so that they could mediate performance of a sequence of actions, a process, or execution of a specific strategy. For example, I asked Amber the guiding question, "What do we

need to consider first?" Guiding questions were rhetorical questions that I asked with the hope that the language would become internalized and transformed to self-mediate the scope and sequence of Amber's actions. Thinking aloud provided models of my thinking, and encouraging her to think aloud provided me with glimpses of her thinking so that I could check for emergent ideas and opportunities for generalizations.

For example, consider this ZPD event from the transcript of Session 13:

> Lexia: pal. [Amber hesitated several seconds. Upon hearing the word, she was to click on the appropriate vowel and click on the blank where it should go. There was also a blank at the end of the word where she could add a silent-e.]
>
> Jane: What would 'a' say if it had an 'e' on the end, Amber?
>
> Amber: pule [pronounced as if it were spelled pule with a long u sound]
>
> Jane: pale. Pale. Do you hear the /a/? Without it, it's just pal. Pal. Which word do you pick?
>
> Amber: [selected pal]
>
> Lexia: pal. Pal
>
> Jane: Okay
>
> Lexia: pile. Pile.
>
> Jane: Good job.

My propositional question, "What would 'a' say if it had an 'e' on the end, Amber?" was coded as cognitive support while providing examples and explanations were coded as instructional support.

My intent in providing *Instructional Support* was to establish the practice of the two of us approaching tasks collaboratively in accord with my view of learning as an active and socially interactive process, where experimentation, proposition, and problem solving were vital activities. I hoped to transform Amber's idea of learning away from the notion of a series of "test" items with only one "right" answer. Although this view of learning seemed to have been reinforced by her interaction with the *Lexia* software, I hoped that I could modify her view of learning. I assumed that if she adopted my view the intense anxiety that surrounded her difficulties with certain tasks could be diminished or eliminated. My instructional support more often involved using hints or open-ended statements rather than providing correct responses directly, such as, "What is the rule of silent-e? Is the vowel sound open, or closed? Look at the other words you have already placed in the correct boxes." On other occasions, *instructional support* involved generating examples or analogies to explain a concept or aid in its generalization, while at the same time providing a link with past learning. More generally, *instructional support* related to acquisition of knowledge about specific content. The following is an excerpt from Session 13 coded only as *instructional support*:

Lexia: Practice with these words will help. Dote, log, job, pine, pope.

Try again. Pope, cob, site. [long hesitation prompting me to intervene.]

Jane: Site. Site. [elongating the vowel sounds] It rhymes with kite. Site.

In some incidences, a particular tutorial move could possibly be coded as a cognitive support or as an instructional support. In these situations, I considered the whole context and categorized each tutor move in the category that appeared most descriptive of the action. If I judged it to pertain more to thinking about how to respond, I would code it as cognitive support,

whereas if it seemed to pertain more to specific knowledge of content, I would code it as *instructional support*.

Emotional support was aimed at reducing the anxiety that began in Phase 1 and continued into the first sessions of Phase 2. With this end in mind, I modeled a more playful approach to responding to tasks. In addition, I encouraged Amber to attribute the blame for errors on my shortcomings as a tutor or on "glitches" in the Lexia software. I consistently rejected her attribution of difficulties to any personal quality or shortcoming. Collaborative problem-solving, where we both participated in cooperatively solving problems provided opportunities for reframing her difficulties with Lexia so that her personal sense of competence would not be adversely affected. An example of one attempt to involve Amber in figuring out the maze activity with question marks follows:

Lexia: Den. [Amber typed din]

Lexia: Try again. Den.

Jane: What are you supposed to do with the question marks? [Amber shrugs her shoulders and lifts her eyebrows] They are not clear to me either. Uhh…

Jane: I wonder if it goes on the line of the vowel. [Amber is wide-eyed and begins chewing gum vigorously]

Jane: I'm not sure.

At this point Lexia had failed to offer instruction about what was expected. I shared my confusion as well and invited Amber to join me in collaboratively figuring out how we were expected to move through the maze. I was certain that there must be some direct connection to the instruction, but it turned out there was not. Later I determined that the maze with question marks task was merely a way of tracking progress through the unit. My interaction with Amber

about the maze task had the goal of ascertaining whether she was aware that the problems she encountered were due to lack of adequate instruction or explanation of the maze task rather than a reflection of her capabilities.

The *Support of Empowerment* category was targeted at encouraging and guiding Amber to play a more active role in contemplating her own learning processes (becoming more metacognitive) . I hoped that she would eventually take charge of her own learning and play a more active role in our interaction, and ultimately in her education. The several examples of collaborative problem-solving when we believed we may have encountered software glitches with Lexia, created a certain distrust of the Lexia program and made it easier for her to challenge its authority in determining how to best address her learning issues. The following excerpt from the transcript of Session 20 provides examples of tutor moves designed to transfer responsibility to Amber for pacing herself through the program and utilizing resources within the program independently. These were coded as *support for empowerment*.

Amber: umbrella [with a full, dimply smile!]

Jane: You got it. [both of us were laughing] That's all you need to know!

Amber: [smiling and stretching her arms as she extends them forward with her hands clasped.] Eeeeeeee.

Jane: Okay. Go right ahead.

Amber: [looking back at me while biting on one side of her lower lip as if asking the question, "Do I have to?" with her expression]

Jane: um hmm.

Lexia: sheep, teeth, goat, snail, street, loaf, paint, load, strain, wheel, Good. Now choose loaf; fail; load; sheet; coal; wheel; street; teeth; goat; strain; paint; snail.

Lexia: [screen shows option to go on or stop]

Amber: Do I push “Go? ” [leaning back to establish eye contact with me as we speak]

Jane: Yeah.

Lexia: loan

Jane: If you want to go on, push “go.” What is it?

Amber: loan

Jane: Okay. [Amber clicks to respond just as Jane starts to speak.] Look at the top. Okay, put that one in. Okay, look at the top

Lexia: great

Jane: and tell me what you think those say. You can click on each one and tell me what they say. Check it out.

For the relative frequency of each of the four categories of support observed in this study, see Figure 5.1.

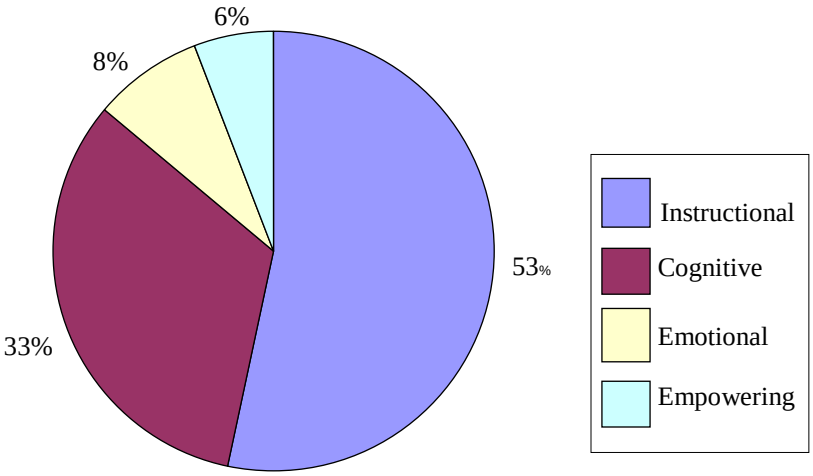

Figure 5.1. Summary distribution of positive tutor moves utilized in Phase 2.

Of the 109 ZPD events, most resulted in Amber choosing the correct answer (102) and few (7) resulted in an incorrect response. Overall, 94% of the ZPD events were positive. Because the tutor is only to provide the support the student needs to perform the task, I identified some indicators of need before providing assistance. There was only one incident when I intervened and could not identify the reason prompting my action in reviewing the video and transcripts. This incident was ineffective and constituted one of the ZPD negative events. Otherwise, I only initiated interaction when there was a purpose or need based on my observations. I consider the tutor moves to have been 94% effective.

As shown in Figure 1, just over half of my tutor moves fell in the category of *instructional support*, approximately one third were *cognitive support*, and *emotional support* and *empowering moves* combined constituted less than 15% of the interactions. However, in comparing the overall effectiveness of each category of tutor move, *instructional support* was effective 96.8% of the times it was used, and *cognitive support* was effective in 95.9% of the times used. However, *emotional support* and *empowering moves* were effective 100% of the times they were employed in the events constituting positive ZPD events. Considering that the most frequent tutor disposition in support of empowerment is to take no observable action, or fade the support as soon as possible, those instances are not readily apparent. However, I noted that there was great variation in the number of ZPD positive events coded for each session. I decided to further explore possible explanations for this variation by considering other qualitative data.

Overall, it appears that my tutor moves were very effective. However, much more is involved in co-constructing a ZPD with a student. Next I will consider other factors that may indicate when Amber's learning was situated within her zone of proximal development.

Co-Construction of the ZPD

The zone of proximal development is an inferred state that is co-constructed through interactions between the tutor and the tutee. This co-construction is a process occurring over time, so we cannot assume that Amber was performing within her ZPD from the beginning of our interaction. Though I had been very conscious of building Amber's trust and confidence in me prior to Phase 2, she had experienced almost no contact with me during the Phase 1 sessions using *Lexia SOS*. Other considerations that may have had an impact Amber's performance in the ZPD, aside from correct responses immediately following coaching, include the overall accuracy rate, the timing of interventions, the extent to which Amber interacted with me using words, and the emotional tone during each session.

First I will focus on Amber's rate of accuracy. To determine the accuracy of each practice set, I counted the number of times Amber had to respond to the *Lexia* program and computed the percentage of correct responses using my transcripts, notes, and the *Lexia Student Report*. Then, I averaged the percentages to determine the rate of accuracy by session (See Figure 5.2) and by activity (See Figure 5.3).

In the analysis of Amber's performance using the *Lexia SOS*™ program in the stand-alone condition in Phase 1, compared to the Phase 2 condition in which she used the software as computer-assisted instruction while working with me as her tutor, there was no obvious change evident by visual inspection of the performance graph. There was overlap between the baseline and the intervention condition in an A-B design, which suggests that there were factors other than the tutoring interaction influencing her performance. This finding motivated me to search for these other factors through more in-depth qualitative analyses.

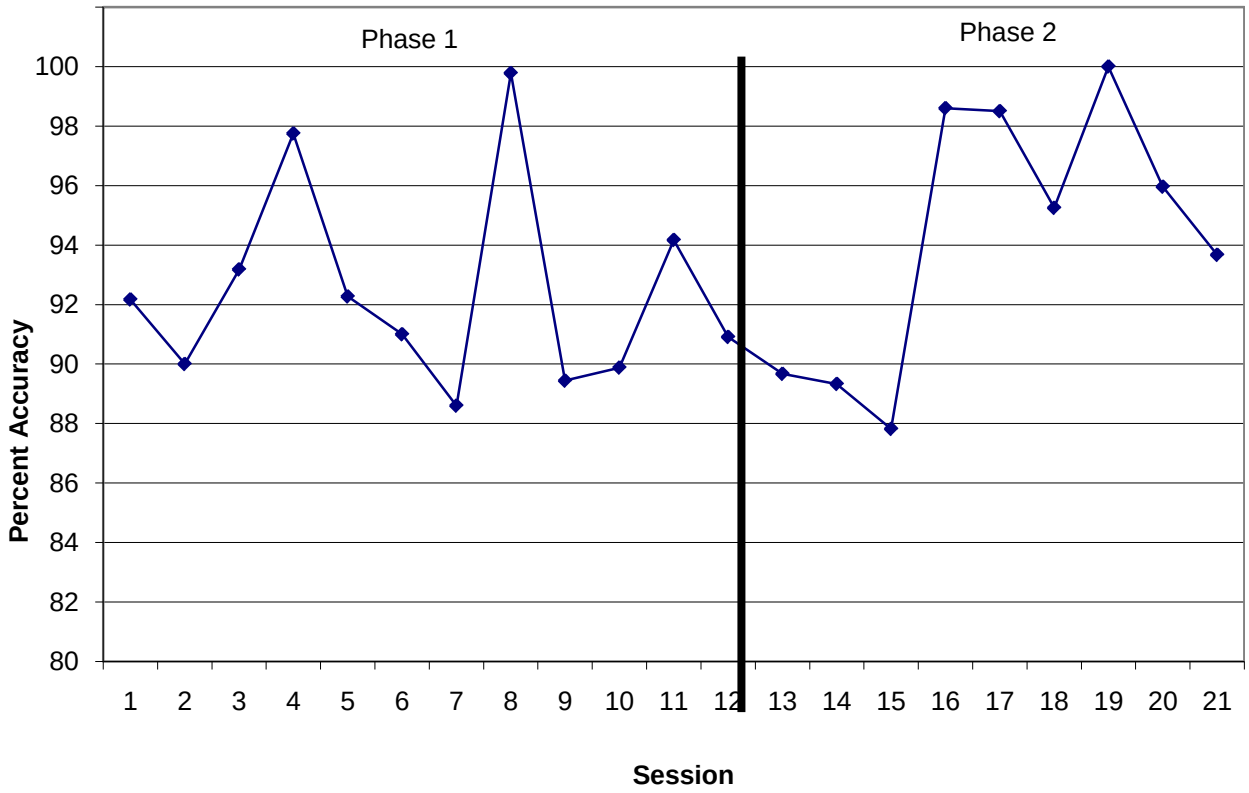

Figure 5.2. Accuracy rate by session.

Most notable is the high rate of accuracy Amber achieved across all sessions in Phase 1 and in Phase 2. However, this is due, in part, to the structure of the Lexia program which required her to complete additional practice sets before advancing to ensure a high rate of accuracy. A comparison of her performance reveals that Amber's accuracy rate during each session in both Phase s 1 and 2 ranged from 88% to 100%.

During the first session in Phase 2, Session 13, I was having difficulty with appropriately timing my interventions. Thus, on several occasions Amber was in the process of clicking her choice when I intervened. Responses indicated by a single mouse click made it difficult to provide assistance prior to her response. Also, considering that she had spent almost five hours working with the Lexia program without my active involvement, it is reasonable that some time

was required to develop a pattern of interaction during Phase 2. However, these issues did not explain the continual decline in her rate of accuracy in sessions 14 and 15.

Because several sessions included work on more than one activity and required different skills and content, I noticed patterns of relative strengths and weaknesses in her performance. To explore this idea more fully, I examined her rate of accuracy by activity (Figure 5.3). In Phase 2, Amber achieved her lowest rate of accuracy (slightly below 88%) in Session 15. Note that this was also the rate of accuracy attained when she was working on the *Short & Long Vowels* activity, and it was the only activity in which her overall performance fell below 90%. Amber began working on the *Short & Long Vowels* activity shortly after entering Phase 2. I terminated her use of this activity at the end of Session 15, when she had completed Units 13 through 16 of a total of 27 units comprising this activity. I also recalled that Amber was very tired on the morning of Session 15, and she reported that she had not slept well. Her first task involved distinguishing between closed syllable and silent-e words using words that began with a consonant blend or digraph. When I started off with frequent coaching, it appeared she was becoming annoyed, so I became conscious of not providing coaching prior to some clear indication of need. Then Amber became more hesitant and restless, accompanied by tears in her eyes and biting on her lip. These actions prompted me to provide her with coaching more frequently. I terminated the activity at the end of the session and advanced her to another for Session 16. For the remaining activities in Phase 2 she achieved an accuracy rate of 95-100%.

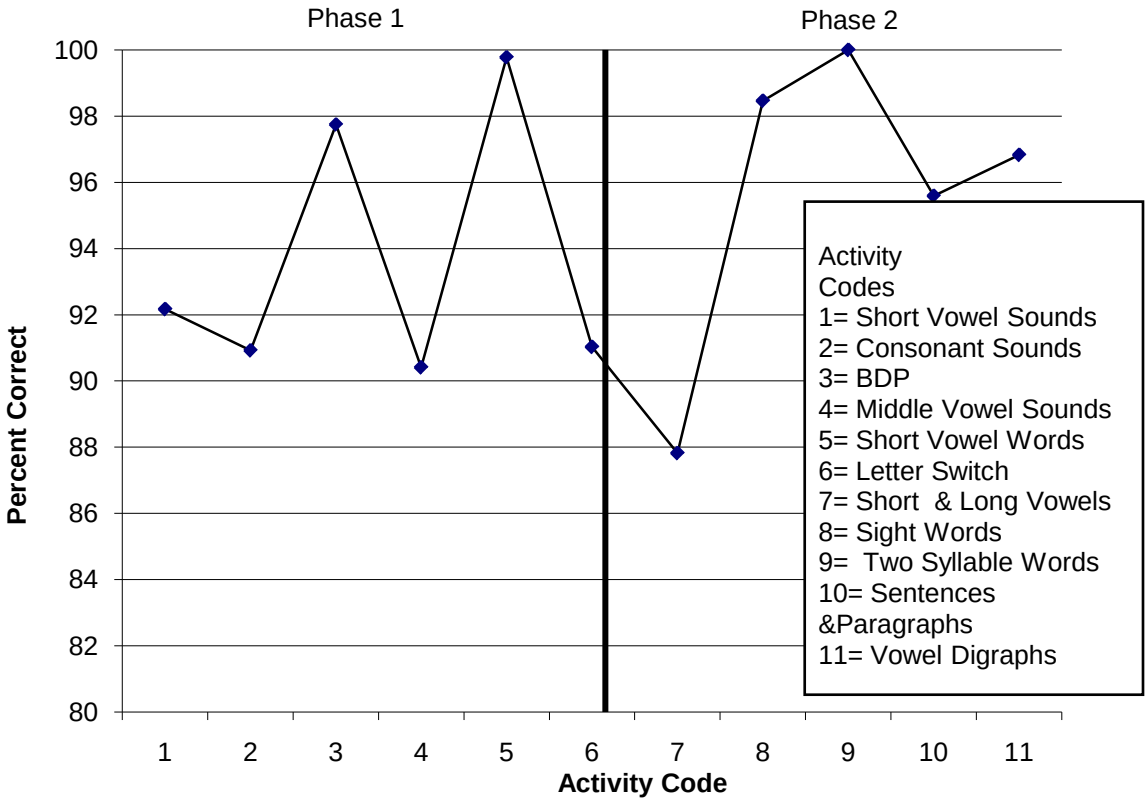

Figure 5.3. Accuracy rate by activity.

Next I considered the effectiveness of my interaction with Amber to better understand the difficulties she was experiencing at this time. To account for the variations in the number of ZPD events per session and in order to visualize the effects of my tutor moves by session, I created a ratio of the number of ZPD+ events to the total number of ZPD events (the sum of ZPD+ events and ZPD- events) per session to determine the percentage of ZPD+ events per session. (See Figure 5.4).

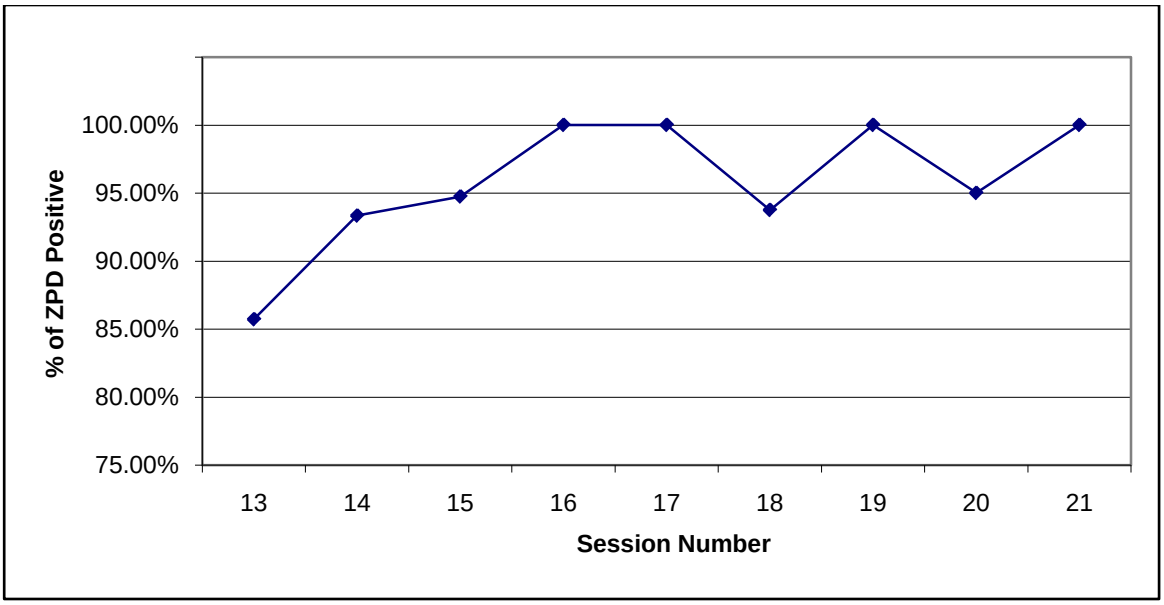

Figure 5.4. The percentage of ZPD positive interventions by session.

I found that the effectiveness of my tutoring steadily improved through the first four sessions of Phase 2 in Sessions 13 through 16. This finding also supports consideration of other factors that may have had an impact on Amber's performance. In Session 13, the first session after entering Phase 2, the tasks involved applying the principles of short vowel sounds in the 'cvc' pattern and long vowel sounds in the 'cvce' or 'cve' patterns. Nonsense words were used Units 21 and 22 of the *Letter Switch* activity and in the first four units of the *Short & Long Vowels* activity. Overall, the difficulty that Amber experienced distinguishing these patterns of short and long vowel sounds seemed to be more persistent and less amenable to my coaching than any other task. Note that the *Short & Long Vowels* activity was the only activity of those she completed in the Lexia program and the only session in Phase 2, in which her overall accuracy rate fell below 90%. Amber's percentages of correct responses, within each of the units completed with my active assistance in Session 13, ranged from 79% to 100%. She scored 100% on only one practice set in which the task involved clicking on the word in a maze that spelled the word presented aurally by the Lexia voice. Note that this task provided an opportunity for

visual comparison of the choices when she heard the aural pronunciation. Also, the instructions for this maze task were explicit and did not create confusion. For example, if the Lexia voice said, “ride,” Amber had to decide whether to click on “rid” or “ride” to advance in the maze.

However, the introduction of the maze with question marks added an unnecessary layer of complexity unrelated to the instructional task and appears to have diverted both Amber and me away from focusing on the specific areas in the instructional sequence where she experienced difficulty. I was so intent on analyzing the purpose of including the maze activity that I initially failed to consider the timing of the introduction of key concepts in the instructional sequence. In further analyses of three interventions coded as ZPD negative during this session, I noted that two of the ZPD negative events involved “grat” and “grate.” In this situation, a nonsense word was paired with a real word. Moreover, there is also a homophone, “great,” which was not mentioned, although it is most likely the form that Amber would find most familiar as it is often used in her oral vocabulary. What if the spelling that was most likely to come to her mind when she heard “grate” pronounced was “g-r-e-a-t”? This observation, coupled with Amber’s speaking of the confusion she experienced with the words, “road” and “rode,” lead me to suspect that Amber’s difficulties were due, at least in part, to her thinking about words in which the long vowel sound was formed using /ea/ or /oa/. However, as these errors occurred at the end of the session, I did not confirm my suspicions regarding the cause of her confusion until reviewing the more advanced content presented in Session 14. Consider this excerpt from the transcript of Session 14:

Lexia: Practice with these words will help. Mule, mug, nut, bug, not, us,

cub, cod, rode, Try again. rode

Jane: Now why will rode go in the other column? humm? Why would you put rode... Why was rode not to go with the closed vowels, but it will need to go with the silent-e ones?

Amber: Cause [inaudible]

Jane: hmmm?

Amber: Because it doesn't have an ‘e’ on the end.

Jane: Well, road....there are two ways of spelling road. One is without a silent-e which is r-o-a-d and one is like, “I rode a horse,” which is r-o-d-e. But you cannot tell [one from the other] by hearing. Do you hear the ‘o’ say its name? Yeah. If you can hear ‘o’ say its name whether it ends in an ‘e’ or not it would go over with the silent-e words. That's the long vowel sound. Okay.

Jane: rode Do you hear the vowel ... say it's name? rooode

[Amber looks very weary and shakes her head, no.] What do you hear? How would you spell rode?

Amber: r o a d

Jane: R- o-a-d is one way and you hear ‘o’ say its name, don't you. [Amber shakes her head yes, but her expression still looks doubtful.] Another way is r- o-d-e. Where would rode go?

[Amber looks quizzical again with one eye shut and her tongue protruding, but indicates the correct response with her cursor before clicking.]

This section of the transcript illustrates that Amber’s knowledge of word spellings included knowledge of words where the long vowel sounds were produced in ways other than use of the ‘cve’ pattern. These observations lead to my understanding of her

difficulties applying the ‘cve’ pattern. The instructional content was below her level of word knowledge. Her more advanced knowledge of other ways to create the long vowel sounds had not been acknowledged or addressed at this point in the Lexia program. Therefore, she found it confusing because it did not incorporate other possible ways to produce the long vowel sound. This may represent an example of what can happen when a student is placed below her zone of proximal development!

Amber was ready to expand her conceptual development to encompass more complexity. Had she been instructed that there were other vowel patterns producing the long vowel sound in words, or if Lexia had avoided using words that had homophones, Amber would likely have understood the targeted concept much more readily and moved ahead. Instead, we continued through Session 15 working on the *Short & Long Vowels* activity until Amber was literally frustrated to tears when I involved her in a joint decision to abandon this activity and move ahead. The tutor is to aim instruction toward the upper limit of the estimate of her student’s ZPD. However, in the case of the *Short & Long Vowels* activity, it appeared that Amber could not advance, at least in part, because the activity was aimed below her ZPD. There were other situations where Amber’s learning was adversely affected by an inappropriate degree of challenge, which I realized when I graphed the number of ZPD events by session (Figure 5.5). Because I had a clearly defined reason for providing assistance in all but one instance, I carefully analyzed the sessions to determine why I offered so little assistance in some sessions. The explanation for the lowest three instances of ZPD events was failure of the Lexia software to offer an appropriate level of challenge. In sessions 16 and 17, when Amber was involved in the *Sight Words* and *Two Syllable Words* activities, the tasks did not

involve new learning. Although the ZPD events were 100% effective in helping her, they were primarily aimed at helping her move past the confusion surrounding the game-like format in these sessions.

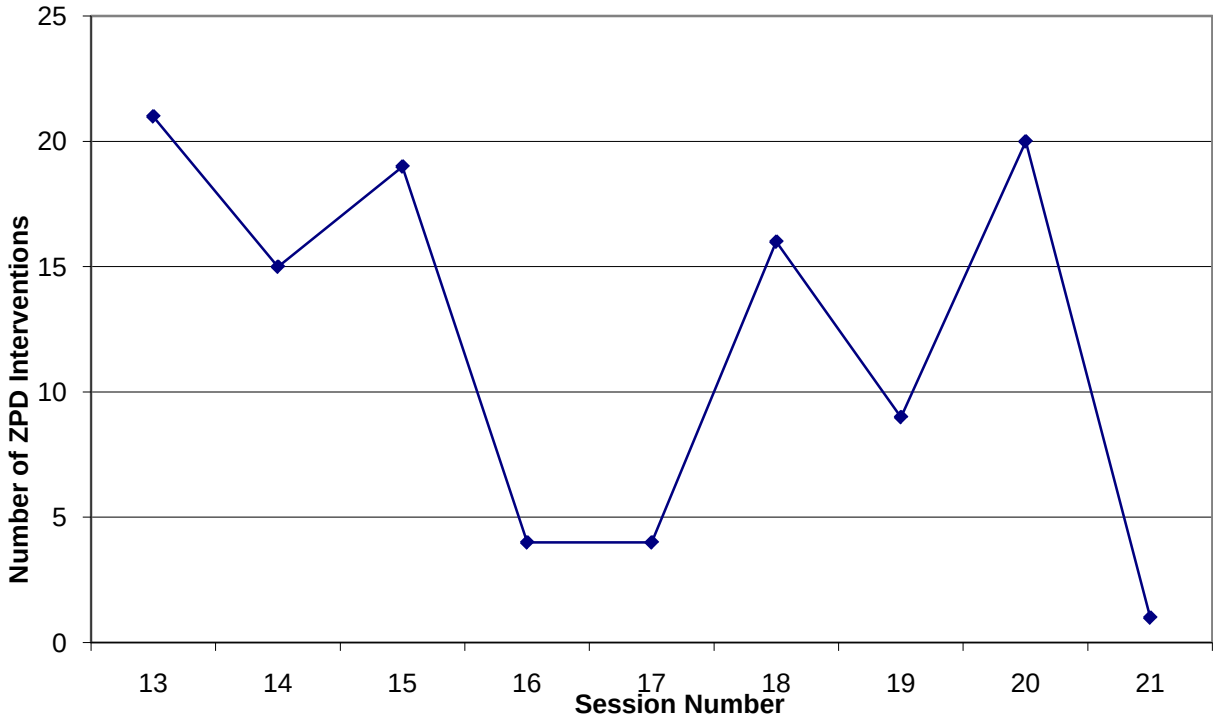

Figure 5.5: The number of ZPD interventions by session.

The highest number of ZPD interventions occurred in Session 20 when Amber was involved with *Sentences and Paragraphs*. The nature of our interaction changed during this session when Amber took the lead in substituting the correct word to complete the cloze passages. She worked systematically by actively decoding unfamiliar words, reading the whole paragraph, and substituting choices in the blanks before making her choices final. I began the practice of asking if she needed assistance before providing it to allow her more time to think for herself. Amber was actively engaged, and often corrected her own miscues. She was sub-vocalizing and thinking aloud, which helped confirm that she was following all the processes I

had modeled earlier. Her emotional tone was very positive as indicated by her joking and laughing about the absurdity of some of the sentences when she tried incorrect word choices. The level of difficulty appeared to be near the top of her zone, and the decreased frequency of scaffolding from me marked her assuming more responsibility for herself. Even as each passage increased in difficulty, it appeared that she was still performing near the top of her ZPD. Most of her difficulties were marked by gaps in her prior knowledge regarding word meanings or specific context that she recognized, and she sought my assistance in "filling" so that she could appreciate the full meaning of the passage. The ZPD events were 100% effective in Session 19 when she was working in the *Sentences and Paragraphs* activity

Session 21, the last session, was curtailed in an effort to equalize the time spent in Phase 1 and Phase 2. Hence, the opportunity for interaction was more limited in part due to the limited time spent in this session. There had been a break between Sessions 20 and 21. When Amber returned for this final session, there was very little interaction around this skills-based *Vowel Digraphs* activity. There were indications of anxiety building, particularly at the end of the session, but the ZPD events were also 100% effective in this final session.

Both the *Sentences and Paragraphs* and the *Vowel Digraphs* activities appeared to have involved considerable new learning for Amber, so the degree of challenge appears to have been appropriate. For optimal results, it is important to aim instructional assistance at the upper boundary of a student's ZPD (Wertsch, 1985), because what she can do with assistance in the present, she can accomplish independently in the near future. This is one of the basic premises underlying the concept of ZPD. To fail to move the student beyond what she can do independently is to withhold the experiences that are necessary for her to further refine her concepts.

Other Indicators of Learning in the ZPD

There are still a number of other indicators that might be considered in determining whether Amber was in her ZPD at any particular point in time. Vygotsky (1986) emphasized the importance of semiotic mediation in the interaction between the student and the teacher or tutor. My notes indicate numerous accounts of reflection on my practices and concern focused on ways to engage Amber in verbal interaction with me during the early sessions in Phase 2. While Amber has a very expressive face, she tended to communicate with very few words. Thus, it is unlikely that the two of us had developed sufficient intersubjectivity to support the co-construction of a zone of proximal development until Session 18.

Because communication in words is necessary for dialogic interaction, I reviewed all twenty-one transcripts and copied the number of words, or word-like verbalizations that Amber made during the Lexia sessions. I copied her verbalizations into a MicroSoft Word™ document and used the word count feature to arrive at a measure of her verbal output for each session. Although she was never very talkative, even in social situations outside of sessions, Figure 5.6 reflects a dramatic increase in her verbalizations during Phase 2. Even though a very large proportion of the increase may be attributed to my request that she read the passages aloud in Sessions 18-20 when she was involved in the *Sentences and Paragraphs* activity, she verbalized her thinking processes and the overall quality and tone of the interaction was noticeably improved when her number of verbalizations increased.

At the beginning of Phase 2 in Session 13, Amber was asked to “think aloud” as she made her choices. During this session, her word count moved up to 67 words. Her pattern of responding minimally and only to direct questions continued until we reached the *Sentences and*

Paragraphs activity during Session 18, and it quickly reverted back to 41 words in Unit 21 when she engaged in the final short session in the *Vowel Digraphs* activity.

I found that Amber most often communicated using only facial expressions, gestures, or single words during the sessions where there were displays of negative emotion (i.e. tears). During the sessions of higher verbalizations, Amber initiated verbal interaction by asking what words meant, or commented that something did not make sense. In addition, when she read aloud, it provided me an opportunity to infer her level of understanding based on miscues and changes in her voice when she was less certain.

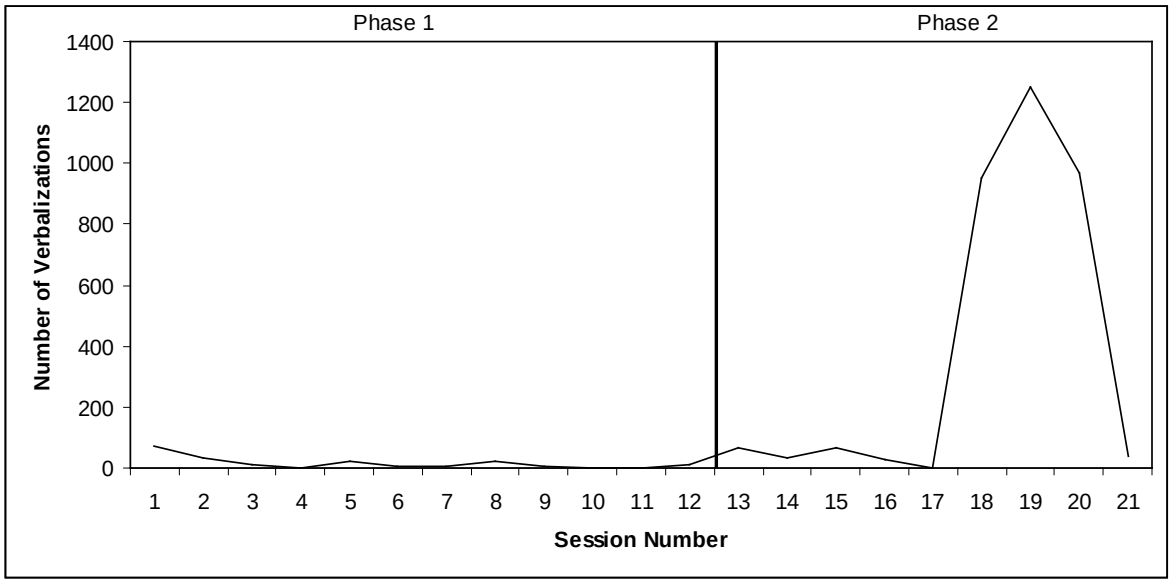

Figure 5.6. Number of Amber's verbalizations by session in each phase.

I also used *Transana* to code every incidence across all sessions in which private speech was indicated, such as when she addressed verbal comments to herself, or lip movements suggested that private speech was occurring. Private speech is an indication that internalization may be taking place. There was one incident in Session 9 and another in Session 12 during Phase 1 when it appeared internalization might have been taking place. However, in Phase 2 there were six separate incidents; one in Session 18, one in Session 19, and four during Session 20. Session

20 was also the second highest in the number of words Amber verbalized in a session, and she had an accuracy rate of 95.96% indicating an appropriate level of challenge for new learning.

The most compelling difference between Phase 1 and Phase 2 was noted in terms of expression of affect. Using *Transana*, I coded Amber's direct indicators of emotion across all the sessions in Phase 1 and Phase 2. Each coded incident was attached to a specific video clip and was printed so I could highlight the specific indication of emotion noted and rate it as a positive or negative emotion. Incidents rated as emotionally positive included situations where Amber's actions were on task but clearly playful: big smiles, laughs, giggles, and on one occasion, she opened her mouth in surprise over a correct answer and gave herself a very animated silent cheer. Incidents rated as emotionally negative included scowls, slamming her hand down on the desktop, tears, mockingly imitating the Lexia voice, and making faces clearly indicating disgust, disapproval, or anger. There were 13 incidents of negative emotions recorded. Only two incidents of negative emotions occurred in Phase 2, one in Session 14 and one in Session 15. Eight of the 11 incidents in Phase 1 were recorded in Session 7. Notably, there were no sessions that included ratings of negative emotion when there were indications of internalization. There were 12 incidents of positive emotions recorded during this study. Eight of these incidents were recorded in Phase 2, and seven of the eight incidents were recorded during Session 20. However, there were six incidents where positive emotions and indications of internalization were observed in close proximity to one another, suggesting some positive correlation between positive emotions and internalization.

I was most certain that Amber was functioning near the top of her zone of proximal development only in Sessions 18-20, while she was working on in the *Sentences and Paragraphs* activity, and in the first session involving *Vowel Digraphs.* During these sessions, there was a

direct correlation between the increase in verbal communication using words and coded instances of private speech in the form of subvocalizations. Furthermore, the coded instances of positive affect marked by a playful, experimental attitude also increased, particularly in Session 20. Only in Sessions 18-20 were there observations of verbal turn-taking and communication based primarily on words. While Amber's gestures and facial expressions were very pronounced and provided excellent clues to her affective states, it was her direct communication in words that was most helpful in providing specific instruction to meet her needs.

Major Insights

In answering the research question, "What indications are there that the interactions between the tutor/researcher and the student establish and sustain learning in the student's zone of proximal development on word recognition tasks?" several factors were noted. During Sessions 18, 19, and 20 when I judged Amber to have been learning within her ZPD, her actions were marked by the following indicators:

- Amber's overall accuracy rate was at 95% or greater.
- My tutor moves were at least 94% positive during these sessions.
- Amber's emotional tone in these sessions was very positive and there was an absence of negative displays of emotion.
- There was an increase in Amber's verbal communication, interaction, and dialogue as opposed to nonverbal communicative gestures and facial expressions.
- There were incidents of private speech observed, which indicated that an internalization of tutoring dialogue was occurring.
- There were indications of Amber monitoring her own performance when she employed a combination of strategies typical of successful readers.

- Amber responded to occasional errors as opportunities to question and actively refine her understandings rather than as negative reflections of her ability or competence.

CHAPTER 6

RESULTS OF ASSESSMENTS

To aid in establishing performance baselines, I administered a series of assessments prior to the onset of any intervention. These same assessments were repeated at the end of Phase 1, and again at the end of Phase 2. This study is designed to evaluate the effectiveness of the interventions in both Phase 1 and Phase 2 by considering data generated by the software itself, data indicating the qualities of Amber's reading behaviors based on independent measures, and extensive qualitative data consisting of audio and video recordings, annotated transcripts, and field notes.

Test Results and Discussion

Qualitative Reading Inventory

Passages were selected from Level 5 as Amber was entering the 5th grade in school, and she had passed the state benchmark test in reading at the end of 4th grade. She began reading the Level 5 passages which proved to be at her frustration level. However, since she would be expected to function in 5th grade textbooks, I was eager to learn what would be needed to make these texts more accessible. The qualities of her reading appeared to change over the course of the study. Miscue analyses for these passages are included in Appendix H. Assessments of her reading proficiency are indicated in the results of her performance on the *Qualitative Reading Inventory-3* summarized in Tables 6.1 and Table 6.2. Criteria for rating performance levels as instructional or frustration scores came from the range of scores as indicated in the scoring section of the accompanying manual.

Table 6.1.

Results When Reading Narrative Text

Qualitative Reading Inventory - 3	Pre-Assessment (Columbus)	Phase 1: Lexia Without Tutoring (M.L.King)	Phase 2: Lexia With Tutoring (M. Mead)
Prior Knowledge	10/12	8/12	6/12
Words Correct	283/317 89%	258/297 87%	321/357 90%
Reading Rate in words per minute	55 wpm	59 wpm	39 wpm
Meaning Change Miscues/Total Miscues	32/37 86% Frustration	21/40 53% Frustration	17/23 74% Instructional
Total Comprehension	5/8 Frustration	4/8 Frustration	6/8 Instructional

Table 6.2.

Results When Reading Expository Text

Qualitative Reading Inventory - 3	Pre-Assessment (Octopus)	Phase 1: Lexia Without Tutoring (Trash)	Phase 2: Lexia With Tutoring (Laser Light)
Prior Knowledge	11/12	8/12	6/12
Words Correct	222/254 87%	206/261 79%	195/257 76%
Reading Rate in words/ minute	78 wpm	61 wpm	43 wpm
Meaning Change Miscues Miscues/Total Miscues	21/35 60% Frustration	18/31 58% Frustration	13/21 62% Instructional
Total Comprehension	5/8 Frustration	3/8 Frustration	5/8 Frustration

Pre-assessment.

First, Amber read the narrative passage entitled *Christopher Columbus*. I provided support to Amber when her voice became tight and cracked as if she were about to lose her composure. I supplied the words, "Ferdinand," "expedition," "merit," "uncharted," and "unexplored," after relatively long hesitations. She seemed to rush through the passage and sometimes she misarticulated words so they seemed to run together. Her volume fell to the point that amplification was necessary to accurately transcribe portions of the recordings for analysis. When she left out the second word in the name of the ship, Santa Maria, I noted that she cleared her throat instead of pronouncing "Maria." Her speech was barely audible at this point. There were seven omissions including the five words listed previously that I supplied so she would continue past the unknown words. She made two self-corrections. There were six miscues (defined in the scoring manual as deviations from the text as written) when she substituted "soldiers" for "sailors." In the context of this passage, these substitutions did little to change the meaning, but in the larger context, soldiers and sailors are not synonymous, so I counted them as meaning changing miscues.

There was one incident of adding two words that did not change the meaning, but instead modified the passage to conform to her manner of speaking. In this instance, she read the sentence, "They were afraid to sail too far to the edge," as "They were afraid to sail <u>out</u> too far, <u>close</u> to the edge."

There was also one incident of her changing the suffix from "discovering" to "discovered," and one incident of her substituting the preposition "from" when the text read "for." There appeared to be little awareness of syllabication as she read "theory" as "the order." There was also one indication of her over-relying on contextual clues when she substituted

"tribe" for "inhabitants." Amber most often read the correct initial sounds of words even when she read a word incorrectly (21/28 miscues), and she substituted words with similar endings on more than half of her miscues (17/28 miscues). On seven occasions she omitted words, and on two occasions she added words to the text. Some of her errors most likely were due to her anxiety (i. e. she read the date, "1492" as "1422" and did not self-correct). She also substituted "and" for "no", "from" instead of "for," and "they" for "he." These were all words she read correctly in many other parts of the passage and her errors were most likely caused by her tendency to rush through the passage.

Next, Amber read the expository passage, *Octopus*. She seemed much more relaxed while reading this passage. This time she omitted only the words, "eight" and "to." On several occasions, when she seemed uncertain of the words, she substituted one or two syllables for the complete word. For example, she said, "fic" for "fiction," "enen" for "enemy" and "comple" for "completely." Other times, she consistently substituted a more familiar, yet similar, word, such as "produce" for "predator" which she did on two occasions. She also substituted "it" or "its" for "this" or "that" on five occasions. There were a total of 16 instances (slightly less than half) where Amber's miscues involved very common sight words of two to four letters. There were only three self-corrections, and of these, only one involved these common sight words. When she substituted "is" for" it," she corrected herself.

Overall, she seemed most interested in reading words continuously, with little attention to accuracy. Though there were fewer miscues on this expository passage, her performance still fit into the upper end of the range for frustration based on her number of miscues and her comprehension scores. Although it seemed as if she were imitating some approximation of fluent

reading, her frequent small errors made it difficult to make sense of the passage, and she spoke mostly in a monotone voice with little inflection.

Assessment following Phase 1: Lexia without tutoring.

At the end of Phase1, the QRI-3 was repeated using other passages on Level 5. It appeared Amber's performance may have deteriorated somewhat after using the *Lexia SOS*™ software for almost five hours without assistance, but I had noted that Amber's health was very poor at the end of Phase 1, which may also have affected her performance adversely. Her comprehension measures were the lowest she received in these two passages following Phase 1. She scored well within the frustration level on both these passages.

She read the Level 5 narrative selection, *Martin Luther King*. There were only two omissions when she read this passage that involved the words, "and" and "the." She attempted to decode words more frequently and read a word for each word presented in the text, even though her total number of miscues increased to 40, the highest number in any of the passages. Slightly over half of these were meaning-changing miscues. There were six substitutions involving use of the correct suffix, particularly when the suffix was "s" or "es." However, she also substituted "separate" for "separating." In addition, there were four substitutions of one preposition for another. Also, there were three incidents involving verbs. For example, she substituted "has" for "was," "did" for "would," and "fight" for "fought." Amber did self-correct three of her errors, which suggested that she was reading ahead somewhat, perhaps as a means of giving herself more opportunity to decode the words. For example, consider the insertion in this sentence: "The laws separating blacks and whites [insertion of "change"] were changed." In the next expository passage she read, she began to have difficulty keeping her place.

The expository passage selected was “Getting Rid of Trash.” Again her errors involved substitutions in which she supplied incorrect verb tenses eight times. I had noticed that Amber often made errors in her speech involving verb tenses. Amber appeared to be trying hard, so I believe she was paraphrasing based on the more meaning-laden words she could identify in the sentences. Again, many of her errors involved simple three or four letter sight words that she easily recognized in other sections of the passage, or when they were presented out of context. Amber lost her place after correctly reading the word, “pollution.” She skipped over 26 words and continued reading on the word “pollution” where it appeared down three lines.

Amber had some difficulty on both the prior knowledge questions and the comprehension questions associated with this passage. She had studied recycling in her school program, and she seemed to interpret each question as being about recycling materials to use again. However, this passage was about alternative ways of disposing of trash. Amber lives in a very rural area, and there is little concern about where to dispose of trash. This apparent interference caused by her prior knowledge may have lowered her scores.

Assessment following Phase 2: Lexia with tutoring.

On the final passages at the end of Phase 2, there was more of a tendency to skip over words or partially decode and offer a word that was in error, but had at least one feature in common with the word in the text. There seemed to be an effort to read fluently with few hesitations even though there was less attention to making sense of the words in the sentence. Amber read slightly more words correctly, with markedly fewer miscues, which resulted in improved comprehension. Analysis of her miscues rose to the instructional level for both narrative and expository texts. Her comprehension score on the narrative passage also reached

the instructional range although her comprehension score on the expository text remained at the upper limit of the frustration level.

Amber read the narrative text, *Margaret Mead*. There were five omissions, including two in which I supported her unsuccessful attempts at decoding the words, “anthropology,” and “modern.” There were also two errors involving substitution of an incorrect verb tense (“made” for “make” and “keep” for “kept”), and one occurrence of substitution of an incorrect singular form for the plural form of a pronoun (“her” for “their”). Again, this may indicate some degree of paraphrasing as she attempted to make meaning of the text, but this time she did not lose her place in the text. I noted in my observations that she propped her head with one hand while she was reading but allowed the other hand to trail down the page as she read. All of Amber’s scores were in the instructional range on this narrative passage.

Finally, Amber read the expository text, *Laser Light*. Some of the same types of error patterns were noted in the miscue analyses for expository texts: errors in verb tenses, errors involving singular or plural nouns, and omissions of words in the text. However, the greatest problem noted was in keeping her place. She lost her place three times in the text and jumped ahead, which caused her to skip over a total of 46 of the words in this passage. Of course, these gaps would have interfered with her making meaning of the text. My notes indicate that she read this last selection in a monotone voice and kept her hands away from the text placed in front of her on the table. There were indications of mounting anxiety as she fingered her clothing and arranged her hair with her hands as she read the passage. She also lowered her voice so the passage could only be scored by viewing the video recording at maximum volume. It appeared that she was trying to hide her difficulties from me and she may have been trying to look ahead for shades of meaning to support her reading. Because her prior knowledge of laser light was

limited to her occasional use of a laser pointer in the tutoring center, this limited knowledge may have been a confusing factor. It would be hard to imagine all the powerful and sophisticated uses of lasers described in the passage with only this limited association. Perhaps her prior knowledge actually interfered with her understanding and made it more difficult for her to make sense of the *Laser Light* passage.

Overall, measures of Amber's prior knowledge before exposure to each passage were quite variable. Notably, the scores declined steadily and corresponded with the order of the testing administration, for both narrative and expository texts. Though the extent of her prior knowledge would not be expected to change as the result of her participation in this study, this decline could be a reflection of her decreasing inclination to respond fully to the questions asked or to an increasing reluctance to take risks in responding verbally. Amber's speed, measured in total words read per minute and adjusted for words not read when she lost her place, increased after Phase 1 when reading narrative texts, but decreased consistently with each subsequent administration for both narrative and expository texts. This finding indicates that as her decoding and word analysis skills increased, she slowed her pace and studied each word more carefully before reading the word aloud. Although her decoding skills were improving, the grade level texts were much too hard for her to read unassisted. However, because most of her scores were in the instructional range by the end of the study, she should be able to manage her grade level texts, albeit with some assistance, particularly in bridging differences in her prior knowledge related to topics in the text.

Informal Phonics Survey

An Informal Phonics Survey was given to Amber to assess her decoding abilities. The results of the *Informal Phonics Survey*, reported in Table 6.3, indicate that Amber's performance

on the pre-assessment was at the level of mastery for all areas but consonants. Her strong performance was in contrast to her school records that indicated difficulties in phonetic decoding, particularly with nonsense syllables. Based on this assessment one might conclude that Amber did not need the intense phonics instruction offered in the *Lexia SOS*™ program. However, because she did not reach mastery for consonant sounds, which is basic phonetic knowledge, I had her begin with level 1 so she would begin with a review of initial consonant sounds. When she was reassessed after Phase 1, Amber demonstrated mastery for consonants sounds and maintained her results of mastery for the other phonic elements.

The improvement in the subtests measuring proficiency in *Consonant Sounds*, and *Consonant Blends in Short Vowel Words* could be attributed to her use of the software, because the Lexia software focused on these areas during her participation in Phase 1. However, the improvement in *Vowel Diphthongs* cannot be attributed to her use of the program as vowel diphthongs were not addressed during Phase 1. On the *Informal Phonics Survey* (Table 6.3), she made no errors on the pre-assessment on the *Short Vowels in CVC Words* subtest or on the *Rule of Silent-e* subtest. These scores are all within the mastery range on the *Informal Phonics Survey*, which suggests she did not need further work on the short vowel sounds. Perhaps the time she spent reviewing these sounds may have served to confuse, rather than clarify, her understandings about short versus long vowel sounds in the medial position.

Table 6.3.

Results of the *Informal Phonics Survey* by Subtest

Informal Phonics Survey	Pre-Assessment	Phase 1: Lexia without Tutoring	Phase 2: Lexia with Tutoring
Consonant Sounds	14/21 Review	19/21 Mastery	18/21 Mastery
Consonant Digraphs	2/3 Mastery	2/3 Mastery	2/3 Mastery
Consonant Blends in Short Vowel Words	10/12 Mastery	11/12 Mastery	10/12 Mastery
Short Vowels in CVC Words	10/10 Mastery	9/10 Mastery	9/10 Mastery
Rule of Silent-e	8/8 Mastery	7/8 Mastery	7/8 Mastery
Vowel Digraphs	8/10 Mastery	8/10 Mastery	7/10 Review
Vowel Diphthongs	5/6 Mastery	6/6 Mastery	5/6 Mastery
R-Controlled Vowels & al	6/6 Mastery	5/6 Mastery	4/6 Review
Total Score	63/76 Mastery	67/76 Mastery	62/76 Mastery

Fry Instant Words Criterion Test

The *Fry Instant Word Criterion Test* was given to assess Amber's word recognition abilities. Speed of recognition is a factor in scoring this test. Amber's performance declined slightly over the course of the study. On the pre-assessment, her scores ranged from 92%-98% correct, which were high enough to cause me to question whether sight word identification would be a good use of her time since she would be likely to identify these words correctly when

she was reading connected texts. The heavy emphasis on phonetic decoding while using the *Lexia* software may have resulted in her losing confidence in her ability to identify words she had previously identified quickly and accurately. Her overall facility with sight words declined somewhat over the course of this study.

She was given all 300 words on the pre-assessment and on the final assessment, but at the end of Phase 2 she was presented with only those words she missed on the previous administration, as directed in the procedures for re-administering the *Fry Instant Words Criterion Test (*McKenna & Stahl, 2003, p.130) and due to concerns regarding her poor health and anxiety at the end of Phase 1 (See Table 6.4).

Table 6.4.

Results on 300 of the *Fry Instant Word Criterion Test*

FRY INSTANT WORDS	PRE-ASSESSMENT	PHASE 1: LEXIA WITHOUT TUTORING	PHASE 2: LEXIA WITH TUTORING
First 100 Words	98/100	2/2*	94/100
Second 100 Words	92/100	8/8*	89/100
Third 100 Words	92/100	7/10*	92/100
Total Words	282/300	17/20*	275/300

*Amber was only tested on those words she missed on the pre-assessment.

On the pre-assessment, Amber had no hesitations on the first or second group of 100 words. However, there was a 3-second delay between the words “thought,” which she identified as “though,” and the word, “head,” which she identified correctly. It seemed as if she were re-considering her response to the word, “thought,” rather than moving on to the next word. She

also responded to the word, “together,” as follows: “to get,” “to get her,” and finally, “together.” All these responses were completed audibly but spoken rapidly so that there was no discernable ½ second delay. Thus I scored it as a self-correction. In searching for error patterns in her substitutions for the words presented on the Pre-Assessment, I noted that she substituted initial consonants and medial vowels, transposed letters within similar words, and substituted consonant blends for other consonant blends or single consonants (Refer to Appendix I: Word Substitutions on the Fry Instant Criterion Test.).

On the assessment at the end of Phase 1: Lexia without Tutoring, Amber was only given the words she had missed on the pre-assessment. Only the words, “own,” “side,” and “leave” were identified incorrectly. She substituted a nonsense word “oin” for the word “own,” a consonant blend for a single consonant, and “leaf” for “leave.” She missed “own” and “side” on all three administrations, and she identified “leave” only on the first of the three administrations. There were no hesitations noted on this assessment.

On the last administration following Phase 2: Lexia with Tutoring, she made the same types of errors. During the first 100 words, there was a 4-second hesitation before the word, “find” as she appeared to be watching me after she noticed I was marking on the protocol sheet even though she could not see what I was writing. After watching me make this mark, she suddenly resumed without comment. There was also a 3-second delay before correctly identifying the word, “head,” and a 2-second delay before correctly identifying the word, “river.” She moved through the lists at a rapid pace, and sometimes she lowered her voice so I had to have her repeat a single word, part of a column, or stop and wait at the end of the column. I supplied her with a word window (a piece of cardboard that I had created with a cut-out large enough for her to see only a single word at a time), but she moved it below the words using the

top edge to mark her place. During the final assessment, Amber lowered her voice and pronounced the words so quickly that I had to stop her ten times during the last 300 words and have her go back to a designated place and begin again from that point. However, she also hesitated on four occasions for periods ranging from two to four seconds, while she watched me record her responses or focused carefully on a particular word. Otherwise, her speed and the poor quality of her responses did not permit me to even place a check mark beside each word. To accurately score her responses, I had to amplify the recordings of her session and use transcribing equipment to provide an opportunity to code her errors. In addition to the error patterns noted in the earlier assessments, on the assessment following Phase 2, Amber substituted similar words, included additional letters, identified similar words by transposing letters, and added affixes to form substituted words.

Overall, Amber's performance on the Fry Instant Criterion Test declined from 282/300 (94%) on the pre-assessment to 275/300 (91.67%) on the final assessment at the end of Phase 2. Perhaps this decline was due to the heavy emphasis on decoding, because sight words are usually targeted for instant recognition as they occur so frequently. In any case, she appeared to be rushing through the lists and lowering her voice to an extremely low volume when she was pronouncing the words, which she apparently did to prevent me from accurately recording her responses (a way of hiding her inadequacies) or to escape the task instead of seeking the highest score possible.

Elementary Qualitative Spelling Inventory

The *Elementary Qualitative Spelling Inventory* was given to Amber to assess her knowledge of letter-sound correspondences (See Table 6.5).

Table 6.5.

Results of the *Elementary Qualitative Spelling Inventory*.

ELEMENTARY QUALITATIVE SPELLING INVENTORY	PRE-ASSESSMENT	PHASE 1: LEXIA WITHOUT TUTORING	PHASE 2: LEXIA WITH TUTORING
Consonant Sounds (Initial and Final)	7/7	7/7	7/7
Short Vowels	4/4	4/4	4/4
Digraphs and Blends	8/8	7/8	8/8
Long Vowel Pattern(Within Words)	3/6	4/6	6/6
Other Vowel Patterns (Within Words)	4/6	3/6	4/6
Syllable Juncture and Easy Prefixes And Suffixes	6/8	5/8	7/8
Harder Prefixes and Suffixes + Unaccented Final Syllables	2/8	3/8	1/8
Reduced & Altered Vowels, Bases, Roots & Derivatives	0/5	0/5	0/5
Feature Points	35/52	33/52	37/52
Words Spelled Correctly	10/25	10/25	14/25

Although there was no indication of improvement following participation in Phase 1: Lexia without tutoring, there were modest improvements in her spelling after Phase 2: Lexia with tutoring. Amber was able to spell four additional words (4/25 or 16%) correctly after Phase 2, but there was no change in the number of words spelled correctly after Phase 1.

The units that Amber covered in the *Lexia SOS*™ program would have only been expected to affect *Short Vowels,* [consonant] *Digraphs & Blends,* and *Long Vowel Patterns (within words).* The [consonant] *Digraphs & Blends* were addressed during Phase 1, but Amber misspelled the word "marched," a word she had spelled correctly on the pre-assessment. She spelled it as "macred" on the assessment following completion of Phase 1. However, she spelled the word "train" as "train" on this same assessment at the conclusion of Phase 1, which she had misspelled as "trian" on the pre-assessment. The use of /ai/ to form the long vowel sound was not addressed until the end of Phase 2, so it is unlikely that the use of the Lexia software caused the correction in her spelling. On the final assessment following the completion of Phase 2, Amber spelled the words "float," "train," "throat," carries," and "marched" correctly after the completion of Phase 2. The more advanced feature skills were not explicitly addressed in Phase 1 sessions, and were addressed only indirectly in Phase 2.

A careful analysis of Amber's performance on the *Elementary Qualitative Spelling Inventory* revealed a tendency to add in extra extraneous letters at the end of words. This tendency cost her feature points, in the *Harder Prefixes and Suffixes & Unaccented Final Syllables* category. However, the number of feature points which involved attention to specific syllables junctures and easy affixes initially declined after Phase 1 (5/8) and then improved following Phase 2 (7/8). Long vowel patterns continually improved over the course of this study from 3/6 (50%) on the pre-assessment, to 4/6 (66.7%) at the end of Phase 1 and to 6/6 (100%) on the final assessment after Phase 2. The only feature points that declined following Phase 2 were "ent," an unaccented final syllable, and "op," (Amber spelled the sound as "oup") as a harder prefix. It appears that the Lexia software program may have caused some confusion during Phase 1 that resulted in Amber losing two feature points, whereas she gained two feature points over

the pre-assessment when she was supported during Phase 2. I attribute this small improvement to her paying closer attention to all parts of words during Phase 2.

Dynamic Indicators of Basic Literacy Skills (DIBELS)

Subtests from DIBELS were given to Amber to assess her oral fluency. The *Word Use Fluency* subtest is designed for students in kindergarten through 3rd grade as an indicator of their capacity for oral language. It consists of the individual presentation of 18 common words and asks the student to orally construct a sentence including the targeted word. If the sentence is appropriate, results are obtained by totaling the number of words in each sentence, and then totaling the number of words for all the appropriate sentences. The scoring and administration guides published with the instrument indicate that no benchmarks have been established for this assessment as the link between oral language and other basic reading skills has not yet been established by scientific research. However, I found his instrument particularly useful with Amber as I had noticed a tendency for her to respond verbally to me only when I directly asked a question or when I specifically asked for a response. I was curious to learn more about her capacity to respond orally to general knowledge questions in order to compare with her responses when she was asked to retell as a measure of her comprehension (See Table 6.6). Following Phase 1, Amber was unable to use the word, "clerk," in a sentence, which she had been able to do in the pre-assessment. This inability could indicate a reluctance to take risks when she was uncertain. During Phase 1: Lexia without tutoring, there was little opportunity to respond in any way other than a mouse click during the sessions. In contrast, during Phase 2: Lexia with tutoring, much more verbal interaction occurred. Amber occasionally initiated verbal interaction during Phase 2 by asking for clarification, thinking aloud, and raising questions.

However, she tended to limit her communication with words as much as possible. These results suggest that there was no change in her oral fluency over the course of this study.

Table 6.6.

Results of Word Use Fluency

DIBELS	PRE-ASSESSMENT	PHASE 1: LEXIA WITHOUT TUTORING	PHASE 2: LEXIA WITH TUTORING
Total Words	116	112	118
Mean number of words per sentence	6.44	6.22	6.56
Range of words per sentence	3-13 words	0 – 12 words	4 – 12 words

The *Dibels Oral Reading Fluency* subtest requires the student read a passage aloud for one minute. The examiner can assist with a word so the student can keep reading. Then the student is directed to retell what she has read. The retelling score consists of the number of words she uses in the retelling. The passages selected were included for students in the fifth grade even though students are expected to score at least 80 correct words per minute by the end of 3rd grade. Amber's results are reported in Table 6.7. Amber's scores on the *Dibels Oral Reading Fluency* are all much less than 80 correct words per minute, which the publishers of this assessment identify as placing students at-risk and in need of intensive intervention. However, Amber's retell scores appear to be adequate, compared to the number of correct words read per

minute. The lack of interaction, the emphasis on decontextualized skills, and the point and click format of responding could have caused her scores to be lower on the assessment following Phase 1. Likewise, the emphasis on increased verbal interaction and making meaning of the texts in Phase 2 may account for the somewhat improved performance on the assessment at the end of Phase 2.

Table 6.7.

Results of Oral Reading Fluency

ORAL READING FLUENCY	PRE-ASSESSMENT	PHASE 1: LEXIA WITHOUT TUTORING	PHASE 2: LEXIA WITH TUTORING
Correct Words Per Minute	52	58	61
Retelling Score	27	19	41
CWPM/Retelling Percentage	51.9%	32.8%	67.2%

Findings

The results of the assessments provided prior to the onset of the study, which were repeated at the end of Phase 1, and again at the end of Phase 2 were the primary sources in answering the two remaining research questions.

To answer the research question, "Were word recognition skills improved by use of *Lexia SOS*™ software alone without intervention on the part of the tutor/researcher?" I compared the results of the pre-assessments with the results of the assessments at the end of Phase 1. The overall results fail to yield a conclusive answer to this question. There were indications of small

improvements, particularly with consonant sounds. There were also indications of Amber's becoming a little more cautious and looking at words more carefully, but there also were indications that she was less responsive to open-ended questions and less willing to express herself verbally. Therefore, it appears that some small improvement was noted, but her anxiety and frustration placed Amber's positive motivation and attitude toward herself as a reader at risk.

The answer to the third research question, "Was the student's rate of progress in word recognition increased using *Lexia SOS*™ software when there was interaction between the tutor/researcher and the student?" was also somewhat inconclusive. Overall, Amber appears to have improved her performance in those assessments that involved integration of multiple skills, such as reading connected texts, spelling, and comprehending text read. However, she may not have improved her performance in assessments of discrete skills after using the Lexia SOS™ program while interacting with me as her tutor.

CHAPTER 7

CONCLUSIONS, LIMITATIONS, AND IMPLICATIONS

The rationale for doing this study was to explore a possible means to extend the benefits of one-to-one contingent tutoring to a larger number of older students who struggled to read grade appropriate texts. I proposed that the use of a computer program designed to individualize instructional content while maintaining an ongoing record of the student's responses might be more efficient, thus reducing the time demands on both tutors and students. In particular, this study was about Amber, an older student who struggled to read grade appropriate texts. Amber used *Lexia SOS*™ software, a program often used as a stand-alone supplement for presentation of remedial instructional content, initially independently and later with tutorial assistance. The findings suggest that interaction with a tutor enhanced learning, even though the software interfered on occasion with co-construction of the ZPD and detracted from the efficiency of the contingent tutoring situation by allocating disproportionate time to decontexualized skills in drill and practice tasks. Enhanced learning occurred within the tutoring context, but Amber's independent use of the Lexia software was of questionable value.

Conclusions

This study affirmed the co-construction of the zone of proximal development through the interactions of the student and the tutor during Phase 2. Amber was much more successful in applying phonological skills in the contextualized learning opportunities provided in the sentences and paragraphs activities compared with her performance when the activities involved drill and practice of decontextualized skills.

Within a culture values and belief systems develop among its members that are communicated through systems of verbal and nonverbal signs and signals. Coles (1985) offered insight in his chapter, “The Zone of Proximal Development: Where Culture and Cognition Create Each Other” (p. 146). Coles explained that the tutor, who is presumed to be more thoroughly steeped in culturally organized experiences, guides the student’s cognition and cognitive development in culturally prescribed ways so that the student acquires the culture. A computer software program utilizing a drill and practice approach could only branch to other instructional content based on her performance. Unlike a human tutor, it could not detect or shape the development of her cognitive processes. The software could not respond to any of the cultural signals in the form of verbal and nonverbal signs that the instructional process was not meeting her needs. The processes underlying the Lexia software are based on the culture of formal schooling in which Amber had previously experienced limited success. She experienced difficulties in moving quickly through some of the units, and she attributed her difficulties to a lack of innate abilities.

Through tutoring in Phase 2, I introduced the idea that this software was produced for the purpose of helping older students acquire the capability to perform the tasks expeditiously, and together we were studying its effectiveness for her. The novel idea that as a consumer of education she could judge the quality of instruction, and that its effectiveness depended on the degree of assistance it provided, mediated Amber’s reaction to her experiences. Amber had already acquired a vast knowledge of words and a repertoire of language experiences. When the skills practiced failed to address or incorporate her pre-existing knowledge of words, as exemplified in the incidences when she recalled and substituted homophones for targeted words,

such as “road” for “rode” and “great” for “grate,” her initial frustration with herself shifted to anger directed toward inadequacies in the software program.

Our dialogue buttressed by our common knowledge of the ways of speaking and being in this rural region and by my participation in the culture of formal schooling, enabled me to discover the patterns of thinking that resulted in errors. Our interaction also provided a cultural bridge to new understandings that expanded the student’s response repertoire. Learning for Amber was best when it required more active involvement, and was situated in a more social context. With one exception, when color codes were used after Amber responded with multiple repeats of the same error, Lexia did not guide her performance or further her understanding by supporting her in making the correct response.

Different groups within the population employ different signs indicating varying emotions. As we shared values, beliefs, and ways of acting that are typical of people living in the local area, I was sensitive to sign systems beyond words that enabled me to tie certain emotions, values, and beliefs with her facial expressions, mannerisms, and language. During the tutoring sessions I was able to anticipate growing frustration and take corrective action before she made additional errors, a feat no software program can accomplish, for it requires being situated in a shared sociocultural context in order to interpret nonverbal signs and symbols. For example, only my fluency in the regional dialect made it possible for me to realize that the words “tint” and “tent” are pronounced identically in this region. This kind of cultural capital cannot be programmed into software, so Amber made the assumption that there was something wrong with the software and that it could not be trusted to respond as expected.

Further, her critical assessments of the software lead her to challenge the authority of the software in its assessments of her performance. She gained confidence in her own abilities which

caused her to take a more active role in her own learning. By closely observing her focus, her task persistence, her body language, and her words, I observed indications of changing self-perceptions as Amber shifted from a view of herself as less capable to judging herself as more accomplished. Although she questioned the value of continuing in the study in Phase 1 and judged herself as "not good enough," by the end of Phase 2 she was critical of the Lexia SOS™ software and recognized that this instructional approach was not well-suited to her needs and ways of learning. When I made mistakes, she became more critical of my help and less reliant on my assistance, thus she came to value her own judgments as more credible.

In short, I observed her reframing her difficulties and shifting her attributions to factors outside of her control, such as the quality of the *Lexia SOS*™, or my effectiveness as a tutor. She began utilizing all her own resources and strategies to achieve success. Though she still had many struggles ahead, she was moving toward taking charge of her own learning and transitioning from a passive learner to an actively involved, engaged learner. In doing so, she reflected on her own processes of questioning and problem-solving, and sought solutions by attempting to tailor her own instructional experiences to match her best ways of learning. She was developing many of the characteristics that describe adults who become highly successful even though they struggled with reading as students (Fink, 1995, 2006; Johnston, 1985; Reiff, Gerber, Ginsberg, 1997). These changes coincided with the shift in her attribution of difficulties and assumption of a more critical stance toward the usefulness and appropriateness of instruction. These attitudes toward difficulties and formal schooling were reframed and internalized through our interactions over the course of this study.

Lexia SOS™ software is the only product of Lexia Learning Systems that is specifically designed to meet the needs of older students who continue to struggle with reading. I found only

one study (Marcaruso & Rodman, 2009), published after completion of my data collection and analyses, that specifically focused on this product and its effects on older students. Results of the Marcaruso and Rodman study suggest that the *Lexia SOS*™ software should be used as a supplement to a comprehensive, teacher-guided program of reading instruction.

Although Lexia Learning Systems has continually revised its web site to provide more in-depth information to product users, several modifications would make this software more useful in a contingent tutoring situation. Inclusion of a detailed task analysis in the accompanying documentation of redesigned software would allow a teacher or tutor to enter and exit the program at any point. Provision of a more detailed record of errors with an explanation of the criteria used for branching or advancing would also render the software more useful in making instructional decisions. Even though Amber may be a student who is more anxious than others or unusually sensitive to frustration, I recommend caution and close monitoring when using drill and practice software with older students who continue to experience reading difficulties. In an overview of research relating to children with reading difficulties, Chall and Curtis (2003) concluded that appropriate instruction for a student with reading difficulties requires frequent formative assessments of the student's progress to provide tailored instruction, and to build on her strengths while directly addressing her needs. In the next revision of the *International Handbook of Literacy and Technology Volume III*, it would be helpful to include a checklist for those selecting software designed to improve word recognition skills to determine whether the software design and documentation provide sufficient flexibility and detail to permit a teacher or tutor to incorporate its activities seamlessly within an individually tailored instructional program.

Limitations

The major limitation of this study is that it involved one student, one tutor, and one computer software program during a specific time period in Amber's education when no other formal educational activity was occurring. Therefore, these findings cannot be generalized to other situations, but they may be somewhat helpful when considered collectively with other studies of older struggling readers. Through this close view of Amber's experiences, the reader may gain additional insights and realize commonalities among other struggling readers.

There are several limitations inherent in this study that must be taken into account in considering the findings. First, there were no assurances that Phase 1 and Phase 2 were equivalent other than the approximate time spent in each condition. The *Lexia SOS*™ software was designed to become continually more difficult as the student advanced through the levels. However, Amber's experiences did not support this idea of increasing levels of difficulty. When Amber was asked to respond to instruction at the word level, she was more proficient than when she was asked to respond at the letter sounds level. Her proficiency was greatest when she was responding to sentences and paragraphs even though this experience was offered only in a portion of Phase 2 when I was tutoring her. Therefore, it is not possible to be certain to what extent Amber's more positive experiences in Phase 2 were due to my tutorial assistance as opposed to her apparent preference for more meaningful textual content. Her accuracy rate across all activities spanned only twelve percentage points because only a few specific phonemes caused most of her difficulties.

Second, competing theoretical orientations underlying the *Lexia SOS*™ software and contingent tutoring resulted in incompatible approaches and methods, which added to Amber's confusion at times. Although instructional methods emerging from different theoretical views

were emphasized in Phase 1 and Phase 2, the two conditions were not independent. I was working to develop and sustain a caring, positive relationship with Amber, to support her vocabulary development, and to encourage her throughout Phase 1 as well as Phase 2. Throughout Phase 1, I showered her with lots of attention, support, and encouragement outside of the sessions, which a student using this program as a stand-alone practice tool in a regular school setting would be unlikely to enjoy. Without this intense attention and support from a caring adult during the school day, it would be likely that a student using the *Lexia SOS*™ software might disengage when difficulties were encountered. Conversely, Phase 2 is likely to have been affected by residual learning, concept formation, and emotional overtones that developed during Phase 1.

Third, the competing discourses of diverse theoretical perspectives were omnipresent in both Phase 1 and Phase 2. The skills-based discourse was invasive in our Phase 2 tutoring sessions, which controlled the instructional content, the skills sequence, and to a large extent, the pacing of the instructional units. My efforts to position Amber's learning in her zone of proximal development were often constrained by the *Lexia SOS*™ program. This continuing presence made it very difficult to determine when to provide more scaffolding, and when to demonstrate restraint and allow her to perform independently. The immediacy and finality of Amber's response, with only a click of the mouse, provided little opportunity for me to engage her in meaningful dialogue prior to her responses. It also provided little opportunity for her to think before making her response or for me to scaffold her performance in the midst of the fast-paced, click-to-respond format. This collision of theoretical perspectives is an important consideration as any incompatibility in the tutor's agenda may adversely affect performance in the ZPD (Cheyne & Tarulli, 1999; Eun, Knotch, & Heining-Boynton, 2008). The conflicting agenda of

the *Lexia SOS*™ program that focused on skills-based instruction hampered my efforts to meet Amber's instructional needs through the use of divergent methods and content. A lack of total control over the instructional content proved to be an important factor inhibiting the co-construction and sustenance of Amber's ZPD on several occasions.

Implications

Determining the qualities that marked Amber's zone of proximal development took me far beyond the consideration of the tutorial instruction provided even though the informal assessments were useful in the diagnostic/prescriptive approach to instruction used in contingent tutoring. In Amber's case study, I was able to track the emergence of some performance skills, document changes in her strategy use, and observe changes in the qualities of her reading as she read connected narrative and expository texts. I also observed her reactions to different levels of challenge through analysis of her task performance, affect, and behaviors and concluded that an appropriate level of challenge facilitated her performance, while her performance deteriorated when the level of challenge was either too low or too high. These observations of multiple indicators of the qualities of the instructional experience would be lost when a student used a computer software program as a stand-alone component of instruction. Even though there are indications that instructional software can scaffold performance to some extent, most notably in the cognitive dimension of instruction (i. e. Mostow et al., 2003), software primarily focusing on drill and practice activities is unlikely to be sufficient in providing the level of support required by an older reader who continues to struggle with grade level texts.

A consideration of Amber's affect was the determining factor in many of my decisions about whether to take action or when and how to provide scaffolding to situate her in her ZPD. Walton (1992) contended "that we progress from limited to more general interpretations of

causal processes through reformulations of the case" (p. 126). He explained that cases are reformulated when "the content and boundaries are reconceived precisely in an effort to forge new generalizations that embrace and supersede earlier understandings" (p. 127). I interpreted this passage as license to forge ahead in my effort to achieve a deeper understanding of Amber's case. I reconceived this case to place more emphasis on those aspects of our interaction that led to reduced anxiety, sustained engagement, and that facilitated greater independence and autonomy as a student. This reconceptualization shifted my attention to more recent theory and research regarding motivation, engagement, and emotion. Because a case study gains a measure of transferability when it is compared to several other cases where similar findings have been reported, I reviewed several other accounts of older students who had struggled while learning to read in school, and I compared and contrasted the actions of these other students with my observations of Amber in varying situations.

Meyer (2002) noted in his observations of a classroom where a scripted phonics lesson was in progress, that some of the students seemed to engage with the lesson by responding correctly or sitting silently while appearing to attend to the lesson. However, he learned from the teacher later in the visit that these were the students who were already proficient readers and writers at their grade levels. Perhaps neutral affect suggests that there is no new learning occurring, which could explain why the students did not exhibit angst since the students were able to perform the requisite tasks without difficulty. Students who are content with external measures of achievement, such as meeting benchmark requirements, or completing Lexia units in Amber's situation, are initially satisfied and display neutral affect, but may soon become bored and disengaged.

In accounts of the anxiety and frustration associated with reading difficulties reported in retrospective studies (Johnston, 1985; Rodis, Garrod, &Boscardin, 2001), I noted some remarkably similar patterns when Amber was experiencing difficulty. She would repeat errors; speed up or slow down her response time; avoid getting started in a timely fashion; move her face so close to the computer screen that she was out of view of the camera; cry, scratch, or chew on her clothing; become more withdrawn and quiet; or display anger and frustration by making faces, mocking the *Lexia SOS*™ software statements, or pounding on the desk. On one occasion, she even appeared to be hitting herself in the face! This study provided a glimpse of how swift and malignant anxiety and frustration can be to a student, in process rather than reported in retrospect. More attention to affective (emotional) factors and degrees of engagement (involvement) could guide tutors in providing more appropriate instruction and improving the outcomes for students by minimizing and reframing the struggle.

In comparing Amber's overall experiences during Phase 1 with her experiences during Phase 2, there is little doubt that there were risks involved in over-emphasizing skills in providing reading instruction, which affirmed the need for caution pointed out by Juel et al., (2003). The *Lexia SOS*™ software used, alone, created a situation akin to a continuing series of tests in which Amber often practiced her previous errors again, and again. This testing context for instruction produced some undesirable effects on Amber's performance and motivation similar to those associated with instructional environments that approximate high stakes, performance-based tests (See Handcock, 2001; Petress, 2006). During Phase 1, this test-like format discouraged risk-taking and tended to hold her for extended periods in certain activities, while at the same time failing to capitalize on her strengths and provide opportunities for her to perform using higher level cognitive skills. Therefore, the instruction offered did not provide

sufficient complexity for her to perform at her potential level. However, when I advanced her to activities involving connected print so that she could use both meaning and phonological clues to comprehend passages (Cartwright, 2002), her anxiety subsided and was replaced by indicators of more positive affect. These activities allowed me to alter the context, from the test-like context to a more playful, interactive, and collaborative context. Coltman et al. (2002) found that more playful, interactive, and collaborative contexts were more effective in enhancing concept development, comprehension, and motivation, which are all characteristic of students performing within the zone of proximal development as described by Vygotsky (1978, 1986).

Indications for Further Research

This study raises many questions about how motives, intellect, and emotions dynamically interweave in the individual's consciousness to mediate a student's actions as she engages with her social environment. Research over the last 25 years relating to student motivation has been prolific and underscores the inextricable links between learning, motivation, and concepts of self (Wigfield, Eccles, & Rodriguez, 1998). The work of Carver (2006) linking observations of student affect to behaviors toward a goal, and relating certain negative affective states to the inadequacy of approach behaviors, contributed to my understanding of Amber's reactions. For example, Carver noted that anger seems to be aimed at regaining lost ground, and that sadness marks the point where the student perceives that the opportunity is lost and further effort seems pointless. However, he stresses that both these affects are still, to some degree, centered on approaching the goal. Frederickson's (1998) study of positive emotions and their capacity to broaden thought-action repertoire by building physical, intellectual, and social resources indicative of learning in the ZPD also contributed to my understanding.

I found these models helpful in theorizing the emotions and mediated actions that were observed as Amber worked through difficult and anxiety-producing periods as well as when she moved beyond such difficulties when we were successful in creating a more playful, collaborative, and instructional environment through our interaction. I see that close attention to emotional clues can be invaluable to tutors in deciding what tutor moves are most likely to be effective in co-constructing a ZPD.

This study supports the position articulated by Ivey and Baker (2004) that encourages reading teachers to avoid quick fixes to reading problems by extending the period of emphasis on phonological awareness and phonics instruction beyond the early primary grades. This study also underscores the interactive nature of the reading act, which combines with motivation, attitude, awareness, self-awareness, perception of self-efficacy, and causal attributions dynamically mediating abilities (Ivey, 1999; Johnston, 1985; Lipson & Wixson, 1986; McCormick, 1994).

More literacy research is needed focusing on the affective, volitional, and relationship aspects of the ZPD. Although the historic view of cognition and emotion as separate poles of a binary has remained entrenched in our educational policies and practices, some literacy researchers (e.g. Goldstein, 1999; Smagorinsky, 2001; Oldfather, 2002) have argued for the inclusion of emotionality in an expanded Neo-Vygotskian framework (Dipardo & Schnack, 2004). Although investigations of learning in the zone of proximal development are fraught with methodological problems (Smagorinsky, 1995), the interrelation of cognition and emotions in both teaching and learning processes has re-emerged to assume a position of centrality in educational research. Methodological advances, more widespread acceptance of qualitative research methods in the social sciences, consideration of research findings crossing disciplinary boundaries, and convergence of “hard” evidence from the neurosciences with “a broad array of

psychological phenomenon" have lead to "multiple levels of analysis," and have resulted in a resurgence of interest in investigating the social, biological, and cultural interrelationships that underpin our human capacities (Ryan, 2007, p. 2). Studies failing to consider this interrelationship of cognition, emotion, and intention are of short-lived efficacy and limited application.

To create better solutions for older students who struggle, we must establish the specific needs of older students as a priority. Addressing these diverse needs will require substantial commitment, investment, and engagement on the part of each tutor/student dyad in order to close gaps in reading over an intense, relatively short period of time, but there is evidence it can be done (Gaffney, Methven, & Bagdasarian, 2002). Closing these gaps as soon as their presence is detected by using contingent tutoring practices based on the needs of older students is ethically imperative, and it may prove to be the most cost and time efficient plan in supporting increased literacy in older students.

Epilogue

Following the conclusion of this study, when Amber returned to school, she stayed on the honor roll throughout the year and was given a Presidential Award for her scholarship at the end of her 5th grade year. She made a successful transition to middle school for 6th grade and I note that she was included in her middle school's publication of honor roll students in the newspaper. She occasionally stops by to visit and reports that she is doing fine and has expressed no need for further tutoring.

REFERENCES

Al Otaiba, S., Schatschneider, C., & Silverman, E. (2005). Tutor-assisted intensive learning strategies in kindergarten: How much is enough? *Exceptionality, 13*, 195-208.

Alberto, P. A., & Troutman, A. C. (1999). *Applied behavior analysis for teachers*. Columbus, OH: Merrill.

Alexander, P. A. (2003). Profiling the developing reader: The interplay of knowledge, interest, and strategic processing. In D. L. Schallert, C. M. Fairbanks, J. Worthy, B. Malock, & J. V. Hoffman (Eds.), *52 Yearbook of the National Reading Conference* (pp. 47-65). Oak Creek, WI: National Reading Conference.

Bakhtin, M. M. (1981). *The dialogic imagination: Four essays.* (C. Emerson & M. Holquist, (Trans.). Austin: University of Texas Press.

Balajthy, E., Reuber, K., & Damon, C. J. (1999). *Using computers for intervention and remediation of severely reading-impaired children in a university literacy clinic*. Paper presented at International Reading Association Convention, San Diego, CA. ERIC Document Reproduction Service No. ED 434 392. Retrieved August 13, 2006, from the Eric database.

Bjørnebekk, G. (2008). Positive affect and negative affect as modulators of cognition and motivation: The rediscovery of affect in achievement goal theory. *Scandinavian Journal of Educational Research*, 52, 153-170.

Bloom, B. S. (1984). The 2 sigma problem: The search for methods of group instruction as effective as one-to-one tutoring. *Educational Researcher, 13*(6), 4-16.

Braun, C., Rennie, B. J., Gordon, C. J. (1987). An examination of contexts for reading assessment. *Journal of Educational Research, 80*, 283-288.

Bruner, J. (1985). Vygotsky: A historical and conceptual perspective. In J. V. Wertsch (Ed.), *Culture, Communication and Cognition: Vygotskian Perspectives* (pp. 21-34). Cambridge, MA: Cambridge University Press.

Bruner, J. (1999). Prologue to the English edition. In R. W. Rieber & A. S. Carton (Eds.) *The Collected Works of L. S. Vygotsky (Vol. 1): Problems of General Psychology* (pp. 1-16). New York: Plenum Press.

Cartwright, K. B. (2002). Cognitive development and reading: The relation of reading-specific multiple classification skill to reading comprehension in elementary school children. *Journal of Educational Psychology*, *90*, 56-63.

Carver, C. S. (2006). Approach, avoidance, and the self-regulation of affect and action. *Motivation and Emotion, 30*, 105-110.

Carver, C. S., & White, T. L. (1994). Behavioral inhibition, behavioral activation, and affective responses to impending reward and punishment: The BIS/BAS scales. *Journal of Personality and Social Psychology*, *67*, 319-333.

Cheyne, J. A., & Tarulli, D. (1999). Dialogue, difference, and voice in the zone of proximal development. *Theory and Psychology, 9, 5-28.*

Chi, M. T. H., Siler, S. A., & Jeong, H. (2004). Can tutors monitor students' understanding accurately? *Cognition and Instruction, 22*; 363-387.

Clarfield, J. (2006). Examining the efficacy of two computerized reading programs for kindergarten students at-risk for reading and behavior problems. (Doctoral Dissertation, University of Massachusetts Amherst, 2006). ProQuest Information and Learning Company (UMI No. 3216946).

Clay, M. M. (1985). *The early detection of reading difficulties.* Auckland, NZ: Heinemann.

Cohen, P. A., Kulik, J. A., & Kulik, C. C. (1982). Educational outcomes of tutoring: A meta-analysis of findings. *American Educational Researcher Journal, 19,* 237-248.

Cole, M. (1985). The zone of proximal development where culture and cognition create each other. In J. V. Wertsch (Ed.), *Culture, communication and cognition: Vygotskian perspectives* (pp. 146-161). Cambridge, MA: Cambridge University Press.

Coltman, P., Petyaeva, D., & Anghileri, J. (2002). Scaffolding learning through meaningful tasks and adult interaction. *Early Years, 22*, 39-49.

Cromley, J. G., & Azevedo, R. (2005). What do reading tutors do? A naturalistic study of more and less experienced tutors in reading. *Discourse Processes, 40,* 83-113.

Daniels, H. (2007). Pedagogy. In H. Daniels, M. Cole, & J. V. Wertsch (Eds.), *The Cambridge companion to Vygotsky* (pp. 307-331). MA: Cambridge University Press.

De Valenzuela, J. S., Connery, M. C., & Musanti, S. I. (2000). The theoretical foundations of professional development in special education: Is social theory enough? *Remedial and Special Education, 21,* 111-120.

Dillon, D. R., O'Brien, D. G., & Heilman, E. R. (2000). Literacy research in the next millennium: From paradigms to pragmatism and practicality. *Reading Research Quarterly, 35*, 10-26.

Dipardo, A., & Schnack, P. (2004). Expanding the web of meaning: Thought and emotion in an intergenerational reading and writing program. *Reading Research Quarterly, 39, 14-37.*

Dornisch, M. M., & Sperling, R. A. (2004). Elaborative questions in web-based text materials. *International Journal of Instructional Media,* 49-59.

Duffy, G. (2002).Visioning and the development of outstanding teachers. *Reading Research and Instruction, 41,* 331-344.

Eisenhardt, K. M. (1989). Building theories from case study research. *Academy of Management Review, 14*, 532-550.

Erlbaum, B., Vaughn, S., Hughes, M. T., & Moody, S. W. (2000). How effective are one-to-one tutoring programs in reading for elementary students at risk for reading failure? A meta-analysis of the intervention research. *Journal of Educational Psychology,* 92, 605-619.

Eun, B., Knotek, S. E., Heining-Boynton, A. L. (2008). Reconceptualizing the zone of proximal development: The importance of the third voice. *Educational Psychology Review*, *20*, 133-147.

Faux, R. (2004). Evaluation of Lexia Software in Boston Public Schools: Final Report. Davis Square Research Associates. Retrieved September 28, 2006 from http://www.lexialearning.com

Fink, R. (1995). Successful dyslexics: A constructivist study of passionate-interest reading. *Journal of Adolescent and Adult Literacy, 39,* 268-280.

Fink, R. (2006). *Why Jane and John couldn't read—and how they learned*. Newark, DE: International Reading Association.

Gaffney, J. S., Methven, J. M., Bagdasarian, S. (2002). Assisting older students to read expository text in a tutorial setting: A case for high-impact intervention. *Reading and Writing Quarterly: Overcoming Learning Difficulties, 18,* 119-50.

Glesne, C. (1999). *Becoming qualitative researchers: An introduction* (2nd ed.). New York: Addison Wesley Longman, Inc.

Goldstein, L. S. (1999). The relational zone: The role of caring relationships in the co-construction of mind. *American Educational Research Journal, 36,* 647-673.

Good III, R. H., & Kaminski, R. A. (Eds.). (2002). *Dynamic Indicators of Basic Early Literacy Skills (6th ed.).* Eugene, OR: Institute for the Development of Educational Achievement. Available from http://dibels.uoregon.edu/

Graesser, A. C., McNamara, D. S., & VanLehn, K. (2005). Scaffolding deep comprehension strategies through Point&Query, Auto Tutor, iSTART. *Educational Psychologist, 40,* 225-234.

Graves, M., & Graves, B. (2003). *Scaffolding reading experiences: Designs for student success* (2nd ed.). Norwood, MA: Christopher-Gordon Publishers, Inc.

Greenwood, S. C. (2002). Word identification in the intermediate and middle grades: Some tenets and practicalities. *Childhood Education*, 79, 26-31. Retrieved April 27, 2007 from http://findarticles.com/p/articles/mi_qa3614/is_200210ai_n9119496

Hancock, D. R. (2001). Effects of test anxiety and evaluative threat on students' achievement and motivation. *Journal of Educational Research, 94,* 284-290.

Harris, T. L., & Hodges, R. E. (Eds.). (1995). *The literacy dictionary: The vocabulary of reading and writing*. Newark, DE: International Reading Association.

Hays, P. A. (2004). Case study research. In K. deMarrais & S. D. Lapan (Eds.) *Foundations for research: Methods of inquiry in education and the social sciences* (pp. 217-234). Mahwah, NJ: Lawrence Erlbaum Associates.

Headsprout. (n.d.). *Headsprout Early Reading* [Computer Software]. http://www.headsprout.com/home/products/

Holquist, M., & Emerson, C. (1981). Glossary. In M. M. Bakhtin, *The dialogic imagination: Four essays* (pp. 423-434), M. Holoquist, (Ed.). M. Holquist and C. Emerson, (Trans.). Austin, TX: University of Texas Press.

Ivey, G. (1999). A multicase study in the middle school: Complexities among young adolescent readers. *Reading Research Quarterly, 34,* 172-192.

Ivey, G., & Baker, M. I. (2004). Phonics instruction for older students? Just say no. *Educational Leadership* (March, 2004), 35-39.

Johnston, P. H. (1985). Understanding reading disability: A case study approach. *Harvard Educational Review, 55,* 153-177.

Juel, C. (1988). Learning to read and write: A longitudinal study of 54 children from first through fourth grades. *Journal of Educational Psychology. 80,* 437-447.

Juel, C. (1996). What makes literacy tutoring effective? *Reading Research Quarterly, 31,* 268-289.

Juel, C., Biancarosa, G., Coker, D., Deffes, R. (2003). Walking with Rosie: A cautionary tale of early reading instruction. *Educational Leadership, 60*(7), 12-18.

Kavale, K. A., & Glass, G. V. (1982). The efficacy of special education interventions and practices: A compendium of meta-analysis findings. *Focus on Exceptional Children, 15*(4), 1-14.

Klingner, J. K., & Edwards, P. A. (2006). Cultural considerations with Response to Intervention models. *Reading Research Quarterly, 41*, 108-117.

Kozulin, A. (1986). Vygotsky in context (pp. 11-5). In *Thought and Language,* Cambridge, MA: MIT Press.

Kuhn, M. R., & Stahl, S. A. (2006). More than skill and drill: Exploring the potential of computers in decoding and fluency instruction. In M. C. McKenna, L. D. Labbo, R. D. Kieffer, & D. Reinking (Eds.), *International handbook of literacy and technology,* (2nd ed.). (pp. 295-301). Mahwah, NJ: Erlbaum.

Kutz, D. A. (2005). The use of the Lexia Phonics computer software program for children in kindergarten and first grade. (Doctoral Dissertation, Widener University, 2005). Dissertation Abstracts International, 66(03), 938. (UMI No. 3167340).

Labbo, L. D., & Teale, W. H. (1990). Cross-age reading: A strategy for helping poor readers. *The Reading Teacher, 43,* 362-369.

Lee, Y., & Vail, C. O. (2005). Computer-based reading instruction for young children with disabilities. *Journal of Special Education Technology, 20*(1) 5-18.

Leslie, L., & Allen, L. (1999). Factors that predict success in an early literacy intervention project. *Reading Research Quarterly, 34*, 404-424.

Leslie, L., & Caldwell, J. (2001). *Qualitative reading inventory, 3.* New York, NY: Addison-Wesley.

Lewandowski, L., Begeny, J., & Rogers, C. (2006). Word-recognition training: Computer versus tutor. *Reading & Writing Quarterly, 22,* 395-410.

Lexia Learning Systems (Version 4.0 F). (2005). *Lexia Strategies for Older Students* (V.4.0 F) [Computer software and manual], Lincoln, MA: Lexia Learning Systems.

Lincoln, Y. S., & Guba, E. G. (2000). The only generalization is: There is no generalization. In R. Gomm, M. Hammersley, & P. Foster (Eds.) *Case study method* (pp. 27-44). London: Sage Publications.

Lipson, M. Y., & Wixson, K. K. (1986). Reading disability research: An interactive perspective. *Review of Educational Research, 56,* 111-136.

Macaruso, P., Hook, P. E., & McCabe, R. (2006). The efficacy of computer-based supplementary phonics programs for advancing reading skills in at-risk elementary students. *Journal of Research in Reading, 29,* 162-172.

Macaruso, P., & Rodman, A. (2009). Benefits of computer-assisted instruction for struggling readers in middle school. *European Journal of Special Needs Education, 24,* 103-113.

Madden, N. A., & Slavin, R. E. (1983). Mainstreaming students with mild handicaps: Academic and social outcomes. *Review of Educational Research, 53,* 519-569.

Magliano, J. P., Todaro, S., Millis, K., Wiemer-Hastings, K., Kim, H. J., & McNamara, D. S. (2005). Changes in reading strategies as a function of reading training: A comparison of live and computerized training. *Journal of Educational Computing Research, 32,* 185-208.

Marsh, S. C. (1995). The role of computer-assisted instruction and other techniques to modify instruction in inclusive first-grade classrooms: “You’re doing work, but the work’s fun.”

(Doctoral Dissertation, Boston University, 1995). Dissertation Abstracts International, 56(04), 1315. (UMI No. 9527046).

Marzano, R. J. (2003). Language, the language arts, and thinking. In J. Flood, D. Lapp, J. R. Squire, & J. M. Jensen (Eds.), *Handbook of research on teaching the English language arts* (2nd ed.). (pp. 687-716). Mahwah, NJ: Lawrence Erlbaum.

Mathes, P. G., Denton, C. A., Fletcher, J. M., Anthony, J. L., Francis, D. J., & Schatschneider, C. (2005). The effects of theoretically different instruction and student characteristics on the skills of struggling readers. *Reading Research Quarterly, 40,* 148-182.

Matthews, D. E., VanLehn, K., Graesser, A. C., Jackson, G. T., Jordan, P., Olney, A., et al. (2007). When are tutorial dialogues more effective than reading? *Cognitive Science, 31,* 3-62.

McCormick, S. (1994). A nonreader becomes a reader: A case study of literacy acquisition by a severely disabled reader. *Reading Research Quarterly, 29,* 157-176.

McEneaney, J. E., Lose, M. K., & Schwartz, R. M. (2006). A transactional perspective on reading difficulties and response to intervention. *Reading Research Quarterly, 41,* 117-128.

McKenna, M. C. (2002). Phonics software for a new millennium. *Reading and Writing Quarterly: Overcoming Learning Difficulties, 18,* 93-96.

McKenna, M. C., & Stahl, S. A. (2003). *Assessment for reading instruction*. New York: Guilford Publications.

Meyer, R. J. (2002). *Phonics exposed: Understanding and resisting systematic direct intense phonics instruction*. Mahwah,NJ: Lawrence Erlbaum Associates.

Mioduser, D., Tur-Kaspa, H., & Leitner, I. (2000). The learning value of computer-based instruction of early reading skills. *Journal of Computer Assisted Learning, 16,* 54-63.

Mostow, J., Aist, G., Burkhead, P., Corbett, A., Cuneo, A., Eitelman, S., et al. (2003). Evaluation of an automated reading tutor that listens: Comparison to human tutoring and classroom instruction. *Journal of Educational Computing Research,* 29, 61-117.

Nassaji, H., & Cumming, A. (2000). What is in ZPD: A case study of a young ESL student and teacher interacting through dialogue journals. *Language Teaching Research, 4,* 95-121.

Neuman, S. B. (2001). Introduction. In C. R. Adler (Ed.) *Put reading first: The research building blocks for teaching children to read* (pp. ii-iii). The Partnership for Reading.

Oldfather, P. (2002). Students' experiences when not initially motivated for literacy learning. *Reading & Writing Quarterly, 18,* 231-256.

Olson, R. K., & Wise, B. (2000). Computer-based remediation. In M. C. McKenna, L. D. Labbo, R. D. Kieffer, & D. Reinking (Eds.), *International handbook of literacy and technology, 2,* (pp. 57-74). Mahwah, NJ: Erlbaum.

Petress, K. (2006). Perils of current testing mandates. *Journal of Instructional Psychology, 33,* 80-82.

Pikulski, J. J. (1997). *Teaching word-identification skills and strategies: A balanced approach.* Houghton Mifflin Company. Retrieved April 26, 2007 from http://www.eduplace.com/rdg/res/teach/

Pinnell, G. S., DeFord, D. E., & Lyons, C. A. (1988). *Reading Recovery: Early intervention for at-risk first graders.* Arlington, VA: Educational Research Service.

Pinnell, G. S., Lyons, C. A., Bryk, A. S., & Seltzer, M., (1994). Comparing instructional models for the literacy education of high-risk first graders. *Reading Research Quarterly, 29,* 8-39.

Purcell-Gates, V. (1995). *Other people's words: The cycle of low literacy.* Cambridge, MA: Harvard University Press.

Reiff, H.B., Gerber, P.J., & Ginsberg, R. (1997). *Exceeding expectations: Successful adults with learning disabilities.* Austin, Texas: Pro-ED.

Rodis, P., Garrod, A. & Boscardin, M. L. (Eds).(2001). *Learning disabilities and life stories.* Boston, MA: Allyn and Bacon.

Rogoff, B. (1990). *Apprenticeship in thinking: Cognitive development in social context.* New York: Oxford University Press.

Ryan, R. M (2007). Motivation and emotion: A new look and approach for two reemerging fields. *Motivation & Emotion, 31*, 1-3.

Scanlon, D. M., Velllutino, F. R., Small, S. G., Fanuele, D. P., & Sweeney, J. M. (2005). Severe reading difficulties—Can they be prevented? A comparison of prevention and intervention approaches. *Exceptionality, 13*, 209-227.

Sealander, K. A. (2004). Single-subject experimental research: An overview for practitioners. In K. deMarrais & S. D. Lapan (Eds.). *Foundations for Research: Methods of inquiry in education and the social sciences,* (pp. 303-327). Mahwah,NJ: Erlbaum.

Shanahan, T. (1998). On the effectiveness of tutoring in reading. In P. D. Pearson, A. Iran-Nejad (Eds.), *Review of Research in Education*. (pp.217-234). Washington, D. C.: American Educational Research Association.

Smagorinsky, P. (1995). The social construction of data: Methodological problems of investigating learning in the zone of proximal development. *Review of Educational Research, 65, 191-212.*

Smith, N. B. (1965). *American reading instruction: Its development and its significance in gaining a perspective on current practices in reading*. Newark, DE: International Reading Association.

Squire, J. R. (2003). The history of the profession. In J. Flood, D. Lapp, J. R. Squire, & J. M. Jensen (Eds.), *Handbook of research on teaching the English arts* (2nd ed.). (pp.3-17). Mahwah, NJ: Lawrence Erlbaum Associates.

Stake, R. E. (1995). *The art of case study research*. Thousand Oaks, CA: Sage.

Stanovich, K.E. (1986). Matthew effects in reading: Some consequences of individual differences in the acquisition of literacy. *Reading Research Quarterly*, *21*, 360-407.

Stevens, D. A. (2000, March). Leveraging Technology to improve test scores: A case study of low-income Hispanic students. Paper presented at the International Conference on Learning with Technology, Temple University, PA, USA. Retrieved September 28, 2006 from http://www.lexialearning.com

Troia, G. A., & Whitney, S. D. (2003). A close look at the efficacy of Fast ForWord Language for children with academic weaknesses. *Contemporary Educational Psychology*, *28*, 465-494.

Vygotsky, L. S. (1978). *Mind in society*: *The development of higher psychological processes.* M. Cole, V. John-Steiner, S. Scribner, & E. Souberman (Eds. & Trans.). Cambridge, MA: Harvard University Press.

Vygotsky, L. S. (1986). *Thought and language*. (A. Kozulin, Ed. & Trans.). Cambridge, MA: MIT Press.

Vygotsky, L. S. (1981). The genesis of higher mental functions. In J. V. Wertsch (Ed.) , *The Concept of activity in social psychology.* Armonk, NY: M. E. Sharpe.

Walton, J. (1992). Making the theoretical case. In C. C. Ragin & H. S. Becker (Eds.) *What is a case? Exploring the foundations of social inquiry* (pp.121-137). Cambridge, MA: Cambridge University Press.

Wertsch, J. V. (1981). *The concept of activity in social psychology.* Armonk, NY: M. E. Sharpe.

Wertsch, J. V. (1985). *Vygotsky and the social formation of mind.* Cambridge, MA: Harvard University Press.

Wertsch, J. V. (1991). *Voices of the mind: A sociocultural approach to mediated action.* Cambridge, MA: Harvard University Press.

Wertsch, J. V. (1998). *Mind as action.* New York: Oxford University Press.

Wertsch, J. V., del Río, P., & Alvarez, A. (1995). Sociocultural studies: History, action, and mediation. In J. V. Wertsch, P. del Río, & A. Alvarez (Eds.) *Sociocultural studies of mind* (pp.1-34). MA: Cambridge University Press.

Wigfield, A., Eccles, J. S., & Rodriguez, D. (1998). The development of children's motivation in school contexts. *Review of Research in Education, 23,* 73-118.

Winsler, A., Feryhough, C., McClaren, M., & Way, E. (2005). *Private speech coding manual.* from George Mason University web site: http://classweb.gmu/awinsler/Resources/PsCodingManual.pdf

Wood, D., Bruner, J., & Ross, G. (1976). The role of tutoring in problem solving. *Journal of Child Psychology and Psychiatry, 17*, 89-100.

Wood, D., & Middleton, D. (1975). A study of assisted problem solving. *British Journal of Psychology, 66*, 181-191.

Wood, D., & Wood, H. (1996). Vygotsky, tutoring and learning. *Oxford Review of Education, 22*, 5-16.

Wood, D. (2007). *Transana 2.20*. (Computer software.), Madison, WI: Wisconsin Center for Research, University of Wisconsin. Available at http://www.transana.org/

Woodcock, R. W., McGrew, K. S., & Mather, N. (2001). *Woodcock-Johnson III tests of achievement.* Rolling Meadows, IL: Riverside Publishing.

APPENDIX A

PERMISSION FORMS

Parental Permission Form

I agree to allow my child _____ to take part in a research study titled "A Case Study of Interaction in a Tutor/Student Dyad Using Computer Assisted Instruction (CAI)", which is being conducted by Jane R. Middleton, from the Department of Language and Literacy, University of Georgia (434-865-4066) under the direction of Dr. Michelle Commeyras, Department of Language and Literacy, University of Georgia (706-542-4621). My child's participation is voluntary and I and my child can refuse to participate or stop taking part at any time without giving any reason, and without penalty. I can ask to have information related to my child returned to me, removed from the research records, or destroyed.

- The purpose of this study is to learn whether the word recognition software, *Lexia Strategies for Older Students (SOS)*, is effective in improving word recognition and decoding skills with my child and to learn more about the interactions between my child, and her tutor/researcher that are most helpful to her in increasing her reading abilities.

- She may improve her reading skills as a result of her participation in this study, and hopefully, we will learn more about the ways her tutor can support her learning best in the future.

- If I allow her to take part, she will be expected to participate in reading tests at the beginning, middle, and end the study. During the first part of the study, she will be asked to do some reading activities and games on the computer while her tutor/researcher, sitting slightly behind Reba, watches and makes notes for 15-30 minutes each session, for twelve sessions. During this first part, the tutor/researcher will not be able to help her. At the end of the first part, the researcher will add up the total amount of time she spent on the computer activities in the first part. That total amount of time is the maximum amount of time she will be able to participate in the second part. During the second part, she will participate in similar activities using the same software program, but this time the tutor/researcher will talk with her to assist her in completing the activities. The tests at the beginning, middle, and end of the study will be used to find out to what extent her reading skills develop when she uses the computer software alone, compared to when the tutor/researcher helps her with the activities. The researcher will ask her to do these activities five days a week for no more than 5 weeks. This activity will take place outside of her regular school activities. The sessions will be audio and video recorded to assist in analyzing the interactions between her and the tutor/researcher.

- The research is not expected to cause any harm or discomfort. She can choose to stop at any time without penalty.

- I will be informed of the findings of this study and provided a full written and oral report of the results of the reading assessments and any other observations if I chose to share this information with teachers and other individuals working with my daughter.

- Results obtained in connection with this study that can be identified with my child will be kept confidential. Individually identifying information will be disclosed only with my permission or as required by law. All results and all tape recordings from will be assigned a code number or will be disguised by a fake name and this number or name will be used on all

of the research records. All recordings will be kept in a locked filing cabinet and/or password protected computer. Audio/video recordings will be destroyed by **December 31, 2008** date.

- There is a possibility that audio or video recordings with my child's voice and/or image could be used in research and educational settings, public presentations, publications, and in web sites. Since this may lead to recognition of my child as a study participant, the researchers are requesting that I specify how the recordings and pictures can be used. If I would like the opportunity to review copies of the tapes or transcripts, I can contact the researcher at the telephone number or email address above.

Audio (and/or Video) Recordings containing my child's voice (and/or image) can be used:		
At conferences presentations and meetings with researchers:(Initial one):		
	Yes	**No**
In classrooms and educational settings. (Initial one):		
	Yes	**No**
On the Internet in multimedia publications and websites (Initial one):		
	Yes	**No**

Photographs of my child can be used:		
At conferences presentations and meetings with researchers (Initial one):		
	Yes	**No**

- The researcher will answer any questions about the research, now or during the course of the project, and can be reached by telephone at: 434-865-4066. I may also contact the professor supervising the research, Dr. Michelle Commeyras, Language and Literacy Department, at 706-542-4621

I understand the study procedures described above. My questions have been answered to my satisfaction, and I agree to allow my child to take part in this study. I have been given a copy of this form to keep.

Jane R. Middleton, Researcher _____ _____
Telephone: 434-865-4066 Signature Date
Email: jane@middletonatlake.com

_____ _____ _____
Name of Parent or Guardian Signature Date

Please sign both copies, keep one and return one to the researcher.

Additional questions or problems regarding your child's rights as a research participant should be addressed to The Chairperson, Institutional Review Board, University of Georgia, 612 Boyd Graduate Studies Research Center, Athens, Georgia 30602-7411; Telephone (706) 542-3199; E-Mail Address IRB@uga.edu

Minor Assent Form

Date: _____

Dear _____,

You are invited to participate in my research project titled, "A Case Study of Interaction in a Tutor/Student Dyad Using Computer Assisted Instruction (CAI)." Through this project I am learning if *Lexia Strategies for Older Students (SOS)* computer software is helpful to you in learning to recognize new words. I am also trying to discover what kinds of things a tutor might say to be most helpful to you when you are learning ways of recognizing new words.

If you decide to be part of this, you will allow me to work with you on your reading and writing. You will need to take some reading and writing tests so we can study your progress. You will talk to me about your reading and writing. You will allow me to watch you and take notes while you are reading, and writing or playing games on the computer. Your participation in this project will not affect your grades in school. We will audio and video record our sessions together to help me remember everything that happens so I can do a thorough study. However, all these records and recordings will be destroyed when they are no longer useful for my study. I will not use your name on any papers that I write about this project. Together with you parents, you can select a new name that I will use instead for writing about this project. Because of your participation you may improve your ability to read and write. I also hope to learn something about reading and writing, and discover ways that I can be of help to other children in the future.

If you want to stop participating in this project, you are free to do so at any time. You can also choose not to answer questions that you don't want to answer. If you have any questions or concern you can always ask me or call my teacher, Dr. Michelle Commeyras at the following number: 706-542-4621.

Sincerely,

Jane R. Middleton
Department of Language and Literacy
University of Georgia
434-865-4066

I understand the project described above. My questions have been answered and I agree to participate in this project. I have received a copy of this form.

_____ _____

Signature of the Participant Date

Please sign both copies, keep one and return one to the researcher.

Additional questions or problems regarding your rights as a research participant should be addressed to The Chairperson, Institutional Review Board, University of Georgia, 612 Boyd Graduate Studies Research Center, Athens, Georgia 30602-7411; Telephone (706) 542-3199; E-Mail Address IRB@uga.edu

APPENDIX B

SAMPLE OF PHASE 1 FIELD NOTES

August 9, 2007

I received a call from Amber today at 1:46 to see if I was coming. She seemed excited that I was on my way. I had scheduled to pick her up after 2:00. She said she had been cleaning house all day (the temperature today was 106!) and had taken a bath and gotten dressed for our session.

Amber had indeed gotten dressed in a beautiful sleeveless dress with a scooped neck made of dark blue velvet. Her hair was pulled back and up off her neck. She looked like a very sophisticated young lady…except for the thong shoes. I wonder if she dressed up because of the video camera. I told her she looked beautiful, and she said this was the coolest outfit she had.

Upon arrival at the tutoring center Amber played with the Center's pet parrot while I turned on all the tape and video recorders. She mentioned several times that she could hardly wait until the parrot got used to her being around. Everything was all set up and ready to go. Based on some of the difficulties with consonant sounds, particularly, I decided it would be best if we started at the beginning. There was no strong indication of difficulty with short vowel sounds based on the testing I did yesterday, and that was first on Level 1, so we started there.

Amber worked diligently and completed all the units on Level 1 short vowel sounds, but not without some difficulties and repeats of units. When she encountered difficulties, she slowed her responses down until on at least two occasions, the program scored it as an error and branched accordingly. I think that "shutting down" may be a frequent response when she encounters difficulty. I really suffered wanting to jump in and help, but I managed to keep myself very busy with my note-taking and resist. At least twice the yellow dots appeared that indicate a student is experiencing significant difficulty and may need further assistance from a

teacher, but Amber persevered through the program and reached mastery criteria for the short vowel sound units, only stopping when I told her we needed to stop for today.

Since I was taking her home, I asked if she would like to use the Internet or do something else while I packed up. She asked to go to a website called primarygames.com, which turned out to be a website to improve academic skills. She told me her favorite was a math game, and she proceeded to complete all the levels. Then she asked if she could write on the white board and she organized all the magnetic words on the top section of the board. While I continued to pack up, she cleaned the entire center! She got everything sparkling. I learned that she wants to be a teacher when she grows up, and she seems to really enjoy being able to move around the center and arrange and organize things. She also enjoyed playing with a karaoke machine that I use to record stories that students are reading aloud on occasion.

I interpret all this to mean that she is enjoying her time at the center and is eager to make this her place. She seems to be relishing her role in helping me learn how to help students better and become a better teacher, as she becomes a better student. She said that after I helped her with her math while she was in summer school, that she had no more trouble. She had reported earlier that she felt a lot of stress regarding her performance in school. Today she said she was looking forward to getting back in school and doing well this year.

I was pleased with the tone and the good relationship I sense we are developing. Amber approaches the tasks with appropriate degrees of seriousness and intensity. She seems determined to learn all she can through this experience. I was excited that the tenseness I was so concerned about yesterday seemed to be gone. On the way in today she did ask if she had spelled any of those words correctly on that test yesterday. I told her she had spelled quite a few of them correctly. I added that she had done well with the tests and I had a really good idea about

where we might need to help her. I told her I thought the work we are doing on the computer will really help her with her reading.

APPENDIX C

SAMPLE OF PHASE 2 FIELD NOTES

August 20, 200

I picked up Amber this morning at the restaurant where she was helping her mom set up tables. On the way in I learned that she had stayed down in North Carolina last night and had gotten up at 3:00 a.m. so her mom could drive up to open the restaurant at 5:30. Amber is getting tired, but we both were looking forward to coming up to speed with phase 2.

Amber did well with session one this morning. I intervened a little, when she seemed to be stuck, and it made a huge difference. It is really hard to know when to intervene. This program moves quickly, and I don't want to intervene unless she really seems to be struggling. Hopefully, I can help her get out of the "testing" mindset where she views everything as a test and build a more collaborative, team approach, to her learning processes. The way this software program is set up also tends to reinforce this 'testing mindset.'

I think I did a pretty good job of coaching Amber this morning. The important thing is to alleviate unnecessary frustration. There was one place in the session this morning that neither of us understood the instructions for playing a contrived game that had little to do with the goals of the lesson. It was as if they had decided a more game-like format would be desirable, so they imposed a maze strategy game where you could move ahead in the game if you gave the correct response. The directions were quite inadequate. We stopped and went back into the program to get the directions repeated, but to no avail. The program started back where we left off without giving us new directions.

I was conscious today of offering some basic rule-based instruction with long and short vowels. Then I followed it up with some examples where she participated along with me. I believe she made some marked headway. I was very conscious today of not always stopping her before she made an incorrect response, so she would not cue off my interactions instead of

responding to the task. I was also too slow intervening, sometimes jumping in just as she clicked her response. I also haven't quite got my notes down in the best way possible. I also note that I need to think carefully before I offer explanations so that I don't confuse Amber even more than she already is. Sometimes I start to say something and revise it part way through the sentence. As I transcribe it, I can see that I even confuse myself on occasion!

I did get the video to transfer into *Transana* today, so that will be a help in getting all the pieces of this to work together. However, I still have quite a learning curve ahead and a rapid pace. Transcribing within *Transana* tonight was quite different from transcribing the audio tapes.

Amber and I broke between sessions for lunch and a shopping trip to buy her mother, whose birthday was yesterday, a birthday gift. She was incredibly appreciative, though I can see on the tapes very clearly how frustrating this program is for her and that in addition to being very tired, she is not feeling well.

APPENDIX D

CODING SYSTEM

Amber

Cognitive

- Internalization Processes
- Private Speech
- Strategic actions

Affective

- Pleasure
    1. Playful actions such as singing, and making jokes.
    2. Smiling
    3. Laughing
    4. Asking to extend sessions
- Anxiety
    1. Agitation such as squirming, wiggling, rising out of her chair.
    2. Comforting herself such as smoothing or twisting her hair, rocking in her chair, rubbing her clothing or stroking her face.
    3. Hesitation such as taking an unusually long time before responding to a question or task.
    4. Shutting down when she failed to respond to task items or verbal interaction with her tutor.

- Frustration
    1. Chewing on her lips, fingers, clothing, and vigorous chewing on her chewing gum
    2. Tears ranging from barely detectable to rolling down her face
    3. Making faces or actions suggestive of displeasure such as sticking out her tongue, scowling, slapping her hand down on the desktop, or stamping her foot
    4. Weariness such as signs of fatigue or boredom including stretching, starring off, or asking to terminate early
- Interactive
    1. Program Question
    2. Reaction to a program question
    3. Social Communication
    4. Reaction to her tutor
    5. Request for assistance regarding the operation of the computer or the software
    6. Interruption not having to do with Amber, the study, or the software

Jane

Operations

- Computer operation related to instructions or troubleshooting computer problems not specific to this software program
- Software operation includes actions or verbalizations related to the *Lexia SOS*™ software program

Caring and Physical Support

- Provided meals when she was hungry
- Provided transportation
- Provided recreational opportunities after weekend sessions
- Provided child care for Amber and her nephew when mother's had to work (Note: My husband took her nephew to the park across the street while Amber and I were engaged in our sessions.)
- Provided materials and resources to support her in school and with planning and time management

Emotional Support

- Encouragement
- Verbalizing areas of strength
- Reassurance
- Reframing to suggest reasons for her difficulties located outside her personal capabilities

Scope and sequence

- Determining level of initial functioning in the *Lexia SOS*™ software program
- Determining when to stop a unit of instruction and move forward in the program

Cognitive Support

- Verbal scaffolding to guide her thinking
- Modeling think-alouds
- Suggesting strategies
- Dialogue with Amber on what he is thinking

Instruction

- Specific instruction related to performance of the required tasks
- Providing additional background information to enhance Amber's performance on the tasks

Empowerment

- Offering Amber options to stop, or continue longer
- Allowing Amber to share in the final decision about when a unit of instruction was no longer helpful
- Allowing Amber to share in the final decision about moving ahead when the previous task seemed too difficult or too easy

ZPD Events

- ZPD positive
- ZPD negative

Lexia SOS™ Software Program

Alerts

- Yellow dots appear to signal the tutor that the student is having an unusual level of difficulty and may need additional assistance
- Yellow dots disappear when the student masters the targeted skill

Errors

- Refers to the situation in which the student fails to respond in accordance with the programming of the software
- While the *Lexia SOS*™ software program keeps track of student errors, if the student receives feedback it is in the form of "Try again."

Instruction

- Initial instruction usually consisted of a single modeling of the associations of letters or groups of letters with targeted sounds
- During the tasks, students often have the option of having a letter or letters and the associated sounds repeated by clicking on the targeted model at the top
- The *Lexia SOS*™ software program will loop and have the student repeat sections when the targeted level of mastery is not reached

Prompting

- The program sometimes uses colors to indicate the correct answer when a student is having difficulty supplying the correct word
- On occasion, the software will not respond when a student chooses an incorrect response.

Intrusion

- The *Lexia SOS*™ software program intrudes on the interaction between the student and the tutor resulting in the interaction ceasing or having a detrimental effect on the quality of the interaction
- When the software counts an error and moves ahead when the student did not make a choice within some undisclosed amount of time

APPENDIX E

SAMPLE OF A CODING AND NOTES COLLECTION SHEET

Transcript 8/27 B ZPD Event	**Tutor Moves With Coding Category**	**Context Details**	**Amber's Response**	**Additional Notes**
#84 lines 20-32 Request for assistance	Scaffolded decoding (instructional) Defined word as wrestle or play (instructional)	" A sea otter, Willie, romps.. What's that word? What's that mean?"	Mispronounces word (rom-pus). Asks for help. Read paragraph with blanks. Fills 1st blank with swims (√)	She actively detected errors and sought my assistance verbally as needed!
#85 lines 34-40 Hesitation	Guiding ? (Cognitive) Affirmed answer (Instructional)	"It floats on its back with a starfish on its chest."	Decoded "chest" (√) Silently then articulated her answer (√)	
#86 lines 45-53 error	Guiding ? (Cognitive) Read choices (Instructional) Collaborative problem-solving (Cognitive)	"*What kind of…".* Then it will dive to get a fresh (X) snack.	Amber answered shell fish (√) and filled in all the other blanks (√)	I suspect she intended to select 'fresh' but may have clicked on 'flash' instead.
#87 lines 54-63 Continued collaboration	Reframed (Cognitive) Continued collaborating (Cognitive) Reassured her (Emotional)	Then it will dive to get a fresh snack. (Lexia highlighted fresh.)	Amber identified 'fresh' or 'flash" but tried 'flash' only because she thought she had clicked on 'fresh' before. Then clicked on 'fresh.' (√)	Because of this issue, Amber had to repeat this paragraph which she did quickly and fluently.

APPENDIX F

CATEGORIZATION OF TUTOR MOVES

Cognitive Support	Instructional Support	Emotional Support	Empowerment Support
Guiding Questions	Response Affirmation	Commendation	Praise for independence
Collaborative Problem Solving	Modeling Word Pronunciation	Pat on shoulder	Questioning reason for response choice
Questioning about her thinking and modeling "think alouds"	Explanation with Modeling and/or examples	Asking if assistance is desired before intervening	Making choice about moving ahead
Focusing question intended to activate her thinking	Pronouncing word elongating vowel sound	Care-giving (i.e. supplying tissues, something to drink, cough drop)	Questioning to promote metacognition
Probing questions	Extended background information	Acknowledging Confusing Task	Invitation to model
Assisting her in making predictions	Providing hint (rhyming word)	Encouraging prompt	Questioning about her strategy use
Use of multiple clues	Mini-lesson	Reassurance	Fading Support
Questions about how she arrived at her answer	Provide and/or coach on application of a strategy	Situating blame on software or factors in the environment; not on Amber's abilities	Using multiple codes (i.e. phonetic, semantic, structural) to select response
Buttressing prior knowledge	Corrective Feedback	Coaxing to try a new strategy	Asking her to describe task
Questioning using analogies	Providing an analogy	Setting relaxed, playful tone	Conversation intended to cultivate her interest
Encouraging dialogue to share thoughts	Supply the answer	Acknowledging Difficulty	Read aloud to fill blanks (trying alternatives)
Encouraging her to "think aloud"	Clarifying new terminology		Encouraging her to share feelings her reactions to a topic
Redirect thinking	Focusing choice		Are you stuck? Tell me where, why, and how I might help.
	Direct action		Deciding to stop or continue in a session
	Scaffolded decoding		Encouraging consideration of choices for herself
	Clarify directions		
	Structural Analysis		
	Model Fluent reading		

APPENDIX G

TASK AND PERFORMANCE ANALYSES OF LEXIA SOS™ ACTIVITIES

	Unit	Set	Description of Skill Required	Record of Errors	Time	Time/ Unit	Average Percentage
Short Vowel Sounds: 8/9/07	Unit 1	1.1	/a/ and /i/ sournds	/a/, /i/	0:01:45		80.00
8/9/07		1.2	/a/ and /i/ sournds	/a/, /i/	0:01:22		80.00
8/9/07		1.3	/a/ and /i/ sournds		0:01:07		100.00
Total Time	Unit 1				0:04:14	0:04:14	
8/9/07	Unit 2	2.1	Initial /a/, /i/, and /o/ sounds in words	otter (2x)	0:01:33		90.00
8/9/07		2.2	Initial /a/ and /o/ sounds in words	obstacle, onward	0:01:11		80.00
8/9/07		2.3	Initial /a/ and /o/ sounds in words	occupy	0:01:02		80.00
8/9/07		2.4	Initial /a/, /i/, and /o/ sounds in words		0:01:23		100.00
Total Time	Unit 2					0:05:09	
Total time	Unit 3	3.1	Initial /a/,/o/, and /e/ sounds in words		0:01:18	0:01:18	100.00
8/9/07	Unit 4	4.1	Initial /e/, /o/, /u/ sounds in words	effort (2x)	0:01:32		90.00
8/9/07		4.2	Initial /e/, /o/ sounds in words		0:01:02		100.00
8/9/07		4.3	Initial /e/, /o/, /u/ sounds in words	utter, + /o/ exemplar	0:01:39		90.00
8/9/07		4.4	Initial /e/, /u/ sounds in words	extra	0:01:15		90.00
8/9/07		4.5	Initial /e/, /o/, /u/ sounds in words	utter	0:01:22		90.00
Total Time	Unit 4					0:06:50	
8/9/07	Unit 5	5.1	Initial /i/, /o/, /u/, and /e/ sounds in words	income, itch, + /i/ exemplar	0:02:22		80.00
8/9/07		5.2	Initial /i/, /u/ sounds in words		0:01:10		100.00
8/9/07		5.3	Initial /i/, /o/, /u/, and /e/ sounds in words	utter (2x), illness	0:02:04		80.00
8/9/07		5.4	Initial /i/, /u/ sounds in words		0:00:57		100.00
8/9/07		5.5	Initial /i/, /o/, /u/, and /e/ sounds in words		0:01:46		100.00
Total Time	Unit 5					0:08:19	
8/9/07	Unit 6	6.1	Initial /a/, /i/, /e/, and /u/ sounds in words		0:01:39	0:01:39	100.00
8/9/07	Unit 7	7.1	Initial /a/, /i/, /o/, /u/, /e/ sounds in words		0:01:56		100.00
8/9/07		7.2	Initial /a/, /i/, /o/, /u/, and /e/ sounds in words		0:01:58		100.00
8/9/07		7.3	Initial /i/, /u/, and /e/ sounds in words	echo	0:01:42		90.00
8/9/07		7.4	Initial /a/, /i/, /o/, /u/, and /e/ sounds in words		0:02:16		100.00

	Unit	Set	Description of Skill Required	Record of Errors	Time	Time/ Unit	Average Percentage
Total Time	Unit 7					0:07:52	
Short Vowel Sounds Total Time					0:39:35	0:04:25	
Consonant Sounds 8/10/07	Unit 1	1.1	Initial /h/, /j/, /k/, /f/, and /v/ sounds		0:01:16	0:01:16	100.00
8/10/07	Unit 2	2.1	Initial /g/, /r/, /y/, /c/, and /w/ sounds		0:01:09	0:01:09	100.00
8/10/07	Unit 3	3.1	Initial /t/, /z/, /l/, and /s/ sounds	zip	0:01:29	0:01:29	90.00
8/10/07	Unit 4	4.1	Initial /b/, /d/, /p/, /m/, and /n/ sounds		0:01:04	0:01:04	100.00
8/10/07	Unit 5	5.1	Initial /m/, /n/, /x/, and /q/ sounds		0:01:11	0:01:11	100.00
8/10/07	Unit 6	6.1	Initial /b/, /p/, /t/, and /d/ sounds		0:01:03	0:01:03	100.00
8/10/07	Unit 7	7.1	Initial /sh/, /wh/, /th/, and /ch/ sounds		0:01:15	0:01:15	100.00
8/10/07	Unit 8	8.1	Initial /st/, /sl/, /sp/, /sn/, and /sm/ sounds	snob	0:01:21	0:01:21	90.00
8/10/07	Unit 9	9.1	Initial /gr/, /gl/, /cl/, /dr/, and /tr/ sounds	glum	0:01:26	0:01:26	90.00
8/10/07	Unit 10	10.1	Initial /fl/, /pr/, /br/, /pl/, and /bl/ sounds	flock, bluff	0:00:54		80.00
8/10/07	Unit 10	10.2	Initial /fl/, /br/, , and /bl/ sounds		0:01:19		100.00
8/10/07	Unit 10	10.3	Initial /fl/, /pr/, /br/, /pl/, and /bl/ sounds		0:01:08		100.00
Total Time	Unit 10					0:03:21	
8/10/07	Unit 11	11.1	Final /sh/, /th/, /ch/, and /ck/ sounds in words	mask, desk	0:01:32		80.00
8/10/07	Unit 11	11.2	Final /sh/ and /ch/ sounds in words	rush, wish, much	0:01:09		70.00
8/10/07	Unit 11	11.3	Final /sh/ and /ch/ sounds in words	such, rush, mash, wish	0:01:12		60.00
8/10/07	Unit 11	11.4	Final /sh/ and /ch/ sounds in words	rush, such, gash	0:01:03		70.00
8/10/07	Unit 11	11.5	Final /sh/ and /ch/ sounds in words	hush	0:01:36		90.00
8/10/07	Unit 11	11.6	Final /sh/, /th/, /ch/, /ck/ sounds in words	rush, gash, sash	0:01:52		70.00
8/10/07	Unit 11	11.7	Final /sh/ and /th/ sounds in words		0:01:16		100.00
8/10/07	Unit 11	11.8	Final /sh/, /th/, /ch/, and /ck/ sounds in words	sack, which	0:00:57		80.00
8/10/07	Unit 11	11.9	Final /ch/ and /ck/ sounds in words	sack	0:01:23		90.00
8/10/07	Unit 11	11.1O	Final /sh/, /th/, /ch/, and /ck/ sounds in words		0:01:23		100.00

	Unit	Set	Description of Skill Required	Record of Errors	Time	Time/ Unit	Average Percentage
Total Time	Unit 11					0:13:23	
8/10/07	Unit 12	12.1	Ending /ng/, /nt/, /nk/, /lk/, and /nd/ sounds in words		0:01:48	0:01:48	100.00
8/10/07	Unit 13	13.1	Ending /st/, /lt/, /pt/, /ft/, and /mp/ sounds in words	swept	0:01:41		90.00
8/10/07	Unit 13	13.2	Ending /pt/, /ft/, and /mp/ sounds in words		0:01:43		100.00
8/10/07	Unit 13	13.3	Ending /st/, /lt/, /pt/, /ft/, and /mp/ sounds in words	wept, swift	0:02:00		80.00
8/10/07	Unit 13	13.4	Ending /st/, /pt/, and /ft/ sounds in words		0:01:33		100.00
8/11/07	Unit 13	13.5	Ending /st/, /lt/, /pt/, /ft/, and /mp/ sounds in words	mast	0:01:27		90.00
Total Time	Unit 13					0:08:24	
8/11/07	Unit 14	14.1	Initial /m/, /n/, /r/, /v/, and /h/ sounds in nonsense words		0:01:15	0:01:15	100.00
8/11/07	Unit 15	15.1	Initial /t/, /s/, /l/, /b/, and /p/ sounds in nonsense words		0:01:25	0:01:25	100.00
8/11/07	Unit 16	16.1	Initial /m/, /n/, /b/, /t/, and /d/ sounds in nonsense words		0:01:09	0:01:09	100.00
8/11/07	Unit 17	17.1	Initial /cr/, /cl/, /sl/, /sh/, and /ch/ sounds in nonsense words	cris, shim	0:00:54		80.00
8/11/07	Unit 17	17.2	Initial /cr/, /cl/, and /sh/ sounds in nonsense words		0:01:12		100.00
8/11/07	Unit 17	17.3	Initial /cr/, /cl/, /sl/, /sh/, and /ch/ sounds in nonsense words	slen	0:01:12		95.00
Total Time	Unit 17					0:03:18	
8/11/07	Unit 18	18.1	Initial /bl/, /pl/, /dr/, /tr/, and /br/ sounds in nonsense words	bril, brem	0:00:53		90.00
8/11/07	Unit 18	18.2	Initial /pl/, /tr/, and /br/ sounds in nonsense words	bril	0:01:08		95.00
8/11/07	Unit 18	18.3	Initial /bl/, /pl/, /dr/, /tr/, and /br/ sounds in nonsense words	plun (2x)	0:01:34		90.00
Total Time	Unit 18					0:03:35	
8/11/07	Unit 19	19.1	Ending /ng/, /nt/, /st/, /ct/, and /sh/ sounds in nonsense words	nect, lish (2x)	0:02:13	0:02:13	85.00

	Unit	Set	Description of Skill Required	Record of Errors	Time	Time/ Unit	Average Percentage
Consonant Sounds Total Time					0:51:05	0:02:33	
Bdp 8/12/07	Unit 1	1.1	Visual sort of letters, b, d, p		0:00:36	0:00:36	100.00
8/12/07	Unit 2	2.1	Visual sort of initial letters, b, d, p in 3-letter words	(2 errors)	0:00:49		80.00
8/12/07	Unit 2	2.2	Visual sort of initial letters, b, and d in 3-letter words		0:00:40		100.00
8/12/07	Unit 2	2.3	Aural sort of initial letters, b, and d in 3-letter words		0:00:34		100.00
Total Time	Unit 2					0:02:03	
8/12/07	Unit 3	3.1	Aural sort of initial letters, b, and d in 3-letter words		0:00:40	0:00:40	100.00
8/12/07	Unit 4	4.1	Aural sort of initial letters, b, and d in 3-letter words	bin	0:00:36	0:00:36	92.00
8/12/07	Unit 5	5.1	Visual sort of ending letters b, d, and p in 3-letter words	[errors scored when she got too close]	0:00:57		100.00
8/12/07	Unit 5	5.2	Visual sort of ending letters, b and p in 3-letter words	[errors scored when she got too close	0:00:45		100.00
8/12/07	Unit 5	5.3	Visual sort of initial letters, b, and d in 3-letter words	[errors when too close]	0:00:48		100.00
Total Time	Unit 5					0:02:30	
8/12/07	Unit 6	6.1	Aural sort of ending letters, b, and d in 3-letter words		0:00:47	0:00:47	100.00
8/12/07	Unit 7	7.1	Aural sort of ending letters, b, and d in 3-letter words		0:00:38	0:00:38	100.00
8/12/07	Unit 8	8.1	Aural sort of initial letters, b, d, and p in 3-letter words		0:00:50	0:00:50	100.00
8/12/07	Unit 9	9.1	Visual sort of initial letters, b, and d in 4-letter words		0:00:46	0:00:46	100.00
8/12/07	Unit 10	10.1	Aural sort of initial letters, b, and d in 4-letter words	bust	0:00:36	0:00:36	90.00

	Unit	Set	Description of Skill Required	Record of Errors	Time	Time/ Unit	Average Percentage
8/12/07	Unit 11	11.1	Visual sort of ending letters, b, and d in 4-letter words		0:00:39	0:00:39	100.00
8/12/07	Unit 12	12.1	Aural sort of ending letters, b, and d in 4-letter words		0:00:45	0:00:45	100.00
8/12/07	Unit 13	13.1	Aural sort of ending letters, b, and d in 4-letter words with consonant blends	crab	0:00:48	0:00:48	93.00
8/12/07	Unit 14	14.1	Visual sort of initial letters, b, d, and p consonant blends in 4-letter words		0:00:48	0:00:48	100.00
8/12/07	Unit 15	15.1	Aural sort of initial b, d, and p consonant blends in 4-letter words		0:00:35	0:00:35	100.00
8/12/07	Unit 16	16.1	Aural insertion of b, d, and p in initial consonant blends in 4-letter words		0:00:41	0:00:41	100.00
bdp Total time					0:14:18	0:02:51	
Middle Vowels 8/13/07	Unit 1	1.1	Aural identification of medial vowel /a/,/i/	fib	0:01:00		89.00
8/13/07	Unit 1	1.2	Aural identification of medial vowel /a/,/i/	lap, bid	0:01:31		86.00
8/13/07	Unit 1	1.3	Aural identification of medial vowel /a/,/i/		0:01:12		100.00
8/13/07	Unit 1	1.4	Aural identification of medial vowel /a/,/i/	nag	0:00:59		86.00
Total Time	Unit 1					0:04:42	
8/13/07	Unit 2	2	Aural identification of medial vowel /a/,/i/, /o/		0:01:01	0:01:01	100.00
8/13/07	Unit 3	3	Aural identification of medial vowel /i/,/e/, and /u/	bid (2x)	0:01:02	0:01:02	86.00
8/13/07	Unit 4	4.1	Aural identification of medial vowel /a/,/e/, /o/, and /u/ in 4-letter words with consonant blends	snag, shed, spun	0:01:08		86.00
8/13/07	Unit 4	4.2	Aural identification of medial vowel /a/,/e/, /o/, and /u/ in 4-letter words with consonant blends	shed, spun	0:01:56		86.00
8/13/07	Unit 4	4.3	Aural identification of medial vowel /a/,/e/, /o/, and /u/ in 4-letter words with consonant blends		0:01:20		100.00
8/13/07	Unit 4	4.4	Aural identification of medial vowel /a/,/e/, /o/, and /u/ in 4-letter words with consonant blends	sung (2x), said, song	0:01:52		93.00

	Unit	Set	Description of Skill Required	Record of Errors	Time	Time/ Unit	Average Percentage
8/13/07	Unit 4	4.5	Aural identification of medial vowel /a/ and /o/ in 4-letter words with consonant blends		0:01:24		100.00
8/13/07	Unit 4	4.6	Aural identification of medial vowel /a/,/e/, /o/, and /u/ in 4-letter words with consonant blends	sing, shed	0:01:44		86.00
8/13/07	Unit 4	4.7	Aural identification of medial vowel /e/, /o/, and /u/ in 4-letter words with consonant blends	step	0:01:46		93.00
8/13/07	Unit 4	4.8	Aural identification of medial vowel /a/,/e/, /o/, and /u/ in 4-letter words with consonant blends	sung	0:01:44		93.00
8/13/07	Unit 4	4.9	Aural identification of medial vowel /a/,/e/, /o/, and /u/ in 4-letter words with consonant blends		0:01:06		100.00
Total Time	Unit 4					0:14:00	
8/14/07	Unit 5	5.1	Aural identification of medial vowel /a/, /i/, /o/, /u/, and /e/ in 4-letter words with consonant blends	spit, fist, stem	0:01:23		79.00
8/14/07	Unit 5	5.2	Aural identification of medial vowel /a/, /i/, /o/, /u/, and /e/ in 4-letter words with consonant blends	fist (2x)	0:02:34		93.00
8/14/07	Unit 5	5.3	Aural identification of medial vowel /a/, /i/, /o/, /u/, and /e/ in 4-letter words with consonant blends		0:01:21		100.00
8/14/07	Unit 5	5.4	Aural identification of medial vowel /a/, /i/, /o/, /u/, and /e/ in 4-letter words with consonant blends		0:02:05		100.00
8/14/07	Unit 5	5.5	Aural identification of medial vowel /a/, /i/, /o/, /u/, and /e/ in 4-letter words with consonant blends	shed, snag	0:01:19		86.00
8/14/07	Unit 5	5.6	Aural identification of medial vowel /a/, /i/, /o/, /u/, and /e/ in 4-letter words with consonant blends	spin	0:02:04		93.00
8/14/07	Unit 5	5.7	Aural identification of medial vowel /a/, /i/, /o/, /u/, and /e/ in 4-letter words with consonant blends	limp	0:01:10		93.00

	Unit	Set	Description of Skill Required	Record of Errors	Time	Time/ Unit	Average Percentage
Total Time	Unit 5					0:11:56	
8/14/07	Unit 6	6.1	Aural identification of medial vowel /a/ and /i/ in 3-letter nonsense words	vin, hin	0:01:01		86.00
8/14/07	Unit 6	6.2	Aural identification of medial vowel /a/ and /i/ in 3-letter nonsense words	hin	0:01:28		93.00
8/14/07	Unit 6	6.3	Aural identification of medial vowel /a/ and /i/ in 3-letter nonsense words	rad, vas, vit	0:00:57		79.00
8/14/07	Unit 6	6.4	Aural identification of medial vowel /a/ and /i/ in 3-letter nonsense words		0:01:23		100.00
8/14/07	Unit 6	6.5	Aural identification of medial vowel /a/ and /i/ in 3-letter nonsense words	val, bal, rab	0:01:25		79.00
8/14/07	Unit 6	6.6	Aural identification of medial vowel /a/ and /i/ in 3-letter nonsense words	hab	0:01:19		93.00
8/14/07	Unit 6	6.7	Aural identification of medial vowel /a/ and /i/ in 3-letter nonsense words		0:01:03		100.00
Total Time	Unit 6					0:08:36	
8/15/08	Unit 7	7.1	Aural identification of medial vowel /a/, /i/, and /o/ in 3-letter nonsense words	wab, pof	0:01:09		86.00
8/15/08	Unit 7	7.2	Aural identification of medial vowel /a/, /i/, and /o/ in 3-letter nonsense words	lav	0:01:39		93.00
8/15/08	Unit 7	7.3	Aural identification of medial vowel /a/, /i/, and /o/ in 3-letter nonsense words	wob, sal, val	0:00:36		79.00
8/15/08	Unit 7	7.4	Aural identification of medial vowel /a/, /i/, and /o/ in 3-letter nonsense words	wob (2x), sal	0:01:34		86.00
8/15/08	Unit 7	7.5	Aural identification of medial vowel /a/, /i/, and /o/ in 3-letter nonsense words		0:01:08		100.00
8/15/08	Unit 7	7.6	Aural identification of medial vowel /a/, /i/, and /o/ in 3-letter nonsense words	wob, pos(2x), mob (2x)	0:01:50		79.00
8/15/08	Unit 7	7.7	Aural identification of medial vowel /a/, /i/, and /o/ in 3-letter nonsense words	vol	0:01:20		93.00
8/15/08	Unit 7	7.8	Aural identification of medial vowel /a/, /i/, and /o/ in 3-letter nonsense words		0:01:31		100.00
8/15/08	Unit 7	7.9	Aural identification of medial vowel /a/, /i/, and /o/ in 3-letter nonsense words		0:01:03		100.00
Total Time	Unit 7					0:11:50	
8/15/08	Unit 8	8.1	Aural identification of medial vowel /a/, /o/,	nom, mol	0:01:05		86.00

	Unit	Set	Description of Skill Required	Record of Errors	Time	Time/ Unit	Average Percentage
			and /u/ in 3-letter nonsense words				
8/15/08	Unit 8	8.2	Aural identification of medial vowel /a/, /o/, and /u/ in 3-letter nonsense words	mot (2x), pas (2x), tum, mon	0:01:58		71.00
8/15/08	Unit 8	8.3	Aural identification of medial vowel /a/, /o/, and /u/ in 3-letter nonsense words	hos	0:01:38		83.00
8/15/08	Unit 8	8.4	Aural identification of medial vowel /a/, /o/, and /u/ in 3-letter nonsense words	vol	0:01:26		93.00
8/15/08	Unit 8	8.5	Aural identification of medial vowel /a/, /o/, and /u/ in 3-letter nonsense words	vob, vol	0:01:06		86.00
8/15/08	Unit 8	8.6	Aural identification of medial vowel /a/, /o/, and /u/ in 3-letter nonsense words	bon, sul	0:01:31		86.00
8/15/08	Unit 8	8.7	Aural identification of medial vowel /a/, /o/, and /u/ in 3-letter nonsense words	mol, tum	0:01:16		86.00
8/15/08	Unit 8	8.8	Aural identification of medial vowel /a/, /o/, and /u/ in 3-letter nonsense words		0:01:10		100.00
8/15/08	Unit 8	8.9	Aural identification of medial vowel /a/, /o/, and /u/ in 3-letter nonsense words	pud, sul,hos (2x)	0:01:43		79.00
8/15/08	Unit 8	8.10	Aural identification of medial vowel /a/, /o/, and /u/ in 3-letter nonsense words		0:01:14		100.00
8/15/08	Unit 8	8.11	Aural identification of medial vowel /a/, /o/, and /u/ in 3-letter nonsense words	mol, moc	0:01:27		86.00
Total Time	Unit 8					0:06:38	
MVS Total Time					1:08:41	0:06:38	
Short Vowel Words 8/16/07	Unit 1	1.1	Aural identification of /a/ and /o/ in 3-letter words		0:02:40	0:02:40	100.00
8/16/07	Unit 2	2.1	Aural identification of /a/, /i/, and /o/ in 3-letter words		0:02:25	0:02:25	100.00
8/16/07	Unit 3	3.1	Aural identification of /a/, /i/, and /o/ in 3-letter words in phrases		0:01:59	0:01:59	100.00
8/16/07	Unit 4	4.1	Aural identification of /u/ and /e/ in 3-letter words in phrases		0:02:21	0:02:21	100.00
8/16/07	Unit 5	5.1	Aural identification of /o/ and /u/ in 3-letter words in phrases		0:02:21	0:02:21	100.00
8/16/07	Unit 6	6.1	Aural identification of /e/ and /u/ in 3-letter		0:01:59	0:01:59	100.00

	Unit	Set	Description of Skill Required	Record of Errors	Time	Time/ Unit	Average Percentage
			words in phrases				
8/16/07	Unit 7	7.1	Aural identification of /a/ and /e/ in 3-letter words in phrases		0:02:21	0:02:21	100.00
8/16/07	Unit 8	8.1	Aural identification of /e/ and /i/ in 3-letter words in phrases		0:01:57	0:01:57	100.00
8/16/07	Unit 9	9.1	Aural identification of /a/, /e/, /i/, /o/ and /u/ in 3-letter words in phrases	neck	0:02:00	0:02:00	98.00
SVW Totals					0:20:03	0:02:14	94
Letter Switch	Unit 1	1.1	Aural transformation of 3-letter words with medial /i/ by substituting initial or final consonants	fit	0:02:04	0:02:04	100.00
8/17/07	Unit 2	2.1	Aural transformation of 3-letter words with medial /o/ or /u/ by substituting initial or final consonants		0:01:28	0:01:28	100.00
8/17/07	Unit 3	3.1	Spell the 3-letter words with medial /o/, /u/, or /i/ to fit the phrase	Pot (2)	0:03:44		83.00
Activity Date	**Unit**	**Set**	**Description of Skill Required**	**Record of Errors**	**Time**	**Time/ Unit**	**Average Percentage**
8/17/07	Unit 3	3.2	Spell the 3-letter words with medial /o/, /u/, or /i/ to fit the phrase		0:01:47		100.00
Total Time	Unit 3					0:05:31	
8/17/07	Unit 4	4.1	Spell 3 or 4 letter words with medial /e/, /a/, or /i/ to form the words containing single or double consonant sounds presented aurally	slam, sled	0:01:51	0:01:51	83.00
8/17/07	Unit 5	5.1	Spell 4 or 5 letter words with medial /a/, /i/, or /u/ to form the words containing single or double consonant sounds presented aurally	sang (3x)	0:05:12		83.00
8/17/07	Unit 5	5.2	Spell 4 or 5 letter words with medial /a/, /i/, or /u/ to form the words containing single or double consonant sounds presented aurally		0:01:37		100.00
8/17/07	Unit 5	5.3	Spell 4 or 5 letter words with medial /a/, /i/, or /u/ to form the words containing single or double consonant sounds presented aurally	sang, rang, rung	0:01:56		67.00
Total Time	Unit 5					0:08:45	

	Unit	Set	Description of Skill Required	Record of Errors	Time	Time/ Unit	Average Percentage
8/17/07	Unit 6	6.1	Select the consonant blend/digraph to spell the word that completes sentence	slap (2x)	0:11:51		95.00
8/18/07	Unit 6	6.2	Select the consonant blend/digraph to spell the word that completes sentence	bring (2x)	0:04:41		88.00
8/18/07	Unit 6	6.3	Select the consonant blend/digraph to spell the word that completes sentence		0:01:28		100.00
	Unit 6					0:18:00	
8/18/07	Unit 7	7.1	Choose the consonant sound, blend, or digraph to substitute to change one word into another		0:01:59	0:01:59	100.00
8/18/07	Unit 8	8.1	Choose the consonant sound, blend, or digraph to substitute to change one word into another	tent, tint	0:03:32	0:03:32	75.00
8/18/07	Unit 9	9.1	Choose the consonant sound, blend, or digraph to substitute to change one word into another		0:04:04	0:04:04	100.00
8/18/07	Unit 10	10.1	Choose the consonant sound, blend, or digraph to spell the word to complete the sentence; then select the words presented aurally	hint, trick (2x), track (2), slick	0:03:41		75.00
8/18/07	Unit 10	10.2	Choose the consonant sound, blend, or digraph to spell the word to complete the sentence; then select the words presented aurally		0:01:53		100.00
8/18/07	Unit 10	10.3	Choose the consonant sound, blend, or digraph to spell the word to complete the sentence; then select the words presented aurally	trick (2x), track (2), drank	0:04:46		81.00
Total Time	Unit 10					0:10:20	
8/19/07	Unit 11	11.1	Transform one word beginning and ending with a consonant, blend/ digraph/ to another by choosing /a/ or /u/	stamp	0:01:35	0:01:35	93.00
8/19/07	Unit 12	12.1	Choose the consonant sound, blend, or digraph to spell the word to complete the sentence; then select the words presented aurally		0:03:29	0:03:29	100.00

	Unit	Set	Description of Skill Required	Record of Errors	Time	Time/ Unit	Average Percentage
8/19/07	Unit 13	13.1	Transform one word beginning and ending with a consonant, blend/ digraph/ to another by choosing /a/, /i/, /o/, or /u/	pile	0:02:25	0:02:25	93.00
8/19/07	Unit 14	14.1	Transform one word beginning and ending with a consonant, blend/ digraph/ to another by choosing closed or silent-e pattern for the vowels	slope (2x)	0:03:16		93.00
8/19/07	Unit 14	14.2	Transform one word beginning and ending with a consonant, blend/ digraph/ to another by choosing closed or silent-e pattern for the vowels	slope	0:01:39		93.00
8/19/07	Unit 14	14.3	Transform one word beginning and ending with a consonant, blend/ digraph/ to another by choosing closed or silent-e pattern for the vowels	slope	0:01:58		93.00
	Unit 14					0:06:53	
8/20/07	Unit 15	15.1	Choose the consonant sound, blend, or digraph or the vowel to spell the word to complete the sentence; then select the words presented aurally		0:02:58	0:02:58	100.00
8/20/07	Unit 16	16.1	Transform one word beginning and ending with a consonant, blend/ digraph/ to another by choosing closed or silent-e pattern for the vowels; then select the words presented aurally	strip, stripe	0:02:24		79.00
8/20/07	Unit 16	16.2	Transform one word beginning and ending with a consonant, blend/ digraph/ to another by choosing closed or silent-e pattern for the vowels; then select the words presented aurally		0:01:18		100.00
8/20/07	Unit 16	16.3	Transform one word beginning and ending with a consonant, blend/ digraph/ to another by choosing closed or silent-e pattern for the vowels; then select the words presented aurally	strap, strip	0:02:06		86.00
8/20/07	Unit 16					0:05:48	

	Unit	Set	Description of Skill Required	Record of Errors	Time	Time/ Unit	Average Percentage
8/20/07	Unit 17	17.1	Transform one word beginning and ending with a consonant, blend/ digraph/ to another by choosing closed or silent-e pattern for the vowels; then select the words presented aurally	bike, lack, stack	0:02:20		79.00
8/20/07	Unit 17	17.2	Transform one word beginning and ending with a consonant, blend/ digraph/ to another by choosing closed or silent-e pattern for the vowels; then select the words presented aurally		0:01:23		100.00
8/20/07	Unit 17	17.3	Transform one word beginning and ending with a consonant, blend/ digraph/ to another by choosing closed or silent-e pattern for the vowels; then select the words presented aurally		0:01:55		100.00
	Unit 17					0:05:38	
8/20/07	Unit 18	18.1	Transform one word beginning and ending with a consonant, blend/ digraph/ to another by choosing closed or silent-e pattern for the vowels; then select the words presented aurally	scrape, scrap, gripe	0:03:48		63.00
8/20/07	Unit 18	18.2	Transform one word beginning and ending with a consonant, blend/ digraph/ to another by choosing closed or silent-e pattern for the vowels; then select the words presented aurally		0:01:48		100.00
8/20/07	Unit 18					0:05:36	
8/20/07	Unit 19	19.1	Transform one nonsense word beginning and ending with a consonant, to another by choosing closed or silent-e pattern for the vowels; then select the nonsense words presented aurally	lat	0:01:28	0:01:28	93.00
8/20/07	Unit 20	20.1	Transform one word beginning and ending with a consonant to another by choosing closed or silent-e pattern for the vowels; then select the nonsense words presented aurally		0:01:33	0:01:33	100.00

	Unit	Set	Description of Skill Required	Record of Errors	Time	Time/ Unit	Average Percentage
LS Totals in Phase 1					1:34:57	0:04:45	
PHASE 2							
Letter Switch 8/22/07 a.m.	Unit 21	21.1	Transform one word beginning and ending with a consonant to another by choosing closed or silent-e pattern for the vowels; then select the nonsense words presented aurally	grat	0:03:47	0:03:47	94.00
8/22/07 a.m.	Unit 22	22.1	Transform one word beginning and ending with a consonant to another by choosing closed or silent-e pattern for the vowels; then select the nonsense words presented aurally	vot	0:02:16	0:02:16	94.00
LS Totals in Phase 2					0:06:03	0:03:02	
Short & Long Vowels 8/22/07 a.m.	Unit 1	1.1	Sort words into closed or silent-e pattern	sip	0:01:56	0:01:56	95.00
8/22/07 a.m.	Unit 2	2.1	Advance through a maze by choosing closed or silent-e pattern for the vowels in words presented aurally		0:00:25	0:00:25	100.00
8/22/07 a.m.	Unit 3	3.1	Spell words presented aurally using closed or silent-e pattern; Advance through a maze	ride, den, kit	0:06:13		84.00
8/22/07 a.m.	Unit 3	3.2	Spell words presented aurally using closed or silent-e pattern; Advance through a maze	kite, fake, nip	0:03:26		79.00
Total Time	Unit 3					0:09:39	
8/22/07 a.m.	Unit 4	4.1	Sort words into closed or silent-e pattern	rod, dim, sip, jog	0:01:32		80.00
8/22/07 a.m.	Unit 4	4.2	Sort words into closed or silent-e pattern	cod, pope, hike	0:01:54		86.00
8/22/07 a.m.	Unit 4	4.3	Sort words into closed or silent-e pattern	rip	0:02:10		95.00
Total Time	Unit 4					0:05:36	
8/22/07 p.m.	Unit 5	5.1	Spell words presented aurally using closed or silent-e pattern; Advance through a maze		0:00:18	0:00:18	100.00
8/22/07 p.m.	Unit 6	6.1	Sort words into closed or silent-e pattern	jug, dude, poke	0:01:20	0:01:20	85.00
8/22/07 p.m.	Unit 7	7.1	Sort words into closed or silent-e pattern	dug, tube, use,	0:01:31		80.00

	Unit	Set	Description of Skill Required	Record of Errors	Time	Time/ Unit	Average Percentage
				pole			
8/22/07 p.m.	Unit 7	7.2	Sort words into closed or silent-e pattern	pope	0:01:33		90.00
8/22/07 p.m.	Unit 7	7.3	Sort words into closed or silent-e pattern	rode, pope	0:02:09		90.00
8/22/07 p.m.	Unit 7	7.4	Sort words into closed or silent-e pattern	nod, mule	0:02:27		90.00
8/22/07 p.m.	Unit 7	7.5	Sort words into closed or silent-e pattern	cute	0:01:15		95.00
8/22/07 p.m.	Unit 7	7.6	Sort words into closed or silent-e pattern	cub, tote, tub	0:01:30		70.00
Total Time	Unit 7					0:10:25	
8/22/07 p.m.	Unit 8	8.1	Advance through a maze by choosing closed or silent-e pattern for the vowels in words presented aurally		0:00:30		100.00
8/22/07 p.m.	Unit 8	8.2	Advance through a maze by choosing closed or silent-e pattern for the vowels in words presented aurally	dude, nod	0:00:21		78.00
Total Time	Unit 8					0:00:51	
8/22/07 p.m.	Unit 9	9.1	Spell words presented aurally using closed or silent-e pattern; Advance through a maze	dune	0:03:55		92.00
8/22/07 p.m.	Unit 9	9.2	Spell words presented aurally using closed or silent-e pattern; Advance through a maze	dune	0:03:51		92.00
Total Time	Unit 9					0:07:46	
8/22/07 p.m.	Unit 10	10.1	Sort words into closed or silent-e pattern	cap	0:02:08	0:02:08	95.00
8/22/07 p.m.	Unit 11	11.1	Advance through a maze by choosing closed or silent-e pattern for the vowels in words presented aurally	rod	0:00:26	0:00:26	90.00
8/22/07 p.m.	Unit 12	12.1	Spell words presented aurally using closed or silent-e pattern; Advance through a maze	ate	0:02:55	0:02:55	93.00
8/23/07 a.m.	Unit 13	13.1	Sort words into closed or silent-e pattern	grim, quite, snake, slim, shade	0:01:39		75.00
8/23/07 a.m.	Unit 13	13.2	Sort words into closed or silent-e pattern	whale, slam, grime	0:07:49		85.00
8/23/07 a.m.	Unit 13	13.3	Sort words into closed or silent-e pattern	spade, snipe	0:06:17		90.00
8/23/07 a.m.	Unit 13	13.4	Sort words into closed or silent-e pattern	shade, stripe, crime	0:02:49		85.00
8/23/07 a.m.	Unit 13	13.5	Sort words into closed or silent-e pattern	spine	0:03:56		95.00
Unit 13						0:22:30	

	Unit	Set	Description of Skill Required	Record of Errors	Time	Time/ Unit	Average Percentage
8/23/07 a.m.	Unit 14	14.1	Advance through a maze by choosing closed or silent-e pattern for the vowels in words presented aurally		0:00:23	0:00:23	100.00
8/23/07 a.m.	Unit 15	15.1	Spell words presented aurally using closed or silent-e pattern; Advance through a maze	spin (2x), spade, gripe	0:03:00		79.00
8/23/07 a.m.	Unit 15	15.2	Spell words presented aurally using closed or silent-e pattern; Advance through a maze	spin, glade, stripe, crime	0:06:34		77.00
8/23/07 a.m.	Unit 15	15.3	Spell words presented aurally using closed or silent-e pattern; Advance through a maze	snip (2x)	0:01:08		85.00
8/23/07 a.m.	Unit 15	15.4	Spell words presented aurally using closed or silent-e pattern; Advance through a maze	bribe	0:01:35		83.00
Total Time	Unit 15					0:12:17	
8/23/07 a.m.	Unit 16	16.1	Sort words into closed or silent-e pattern	slum, slid, flute	0:05:26	0:05:26	85.00
S & L Vowels Totals					1:24:21	0:05:16	
Sight Words 8/23/07 p.m	Unit 1	1.1	Word search and spelling practice with to, do, and of		0:05:52		100.00
8/23/07 p.m	Unit 1	1.2	Word search and spelling practice with to, do, and of	Error scored for clicking on word search out of order	0:02:53		95.00
Total Times	Unit 1					0:08:45	
8/23/07 p.m	Unit 2	2.1	Word search and spelling practice with you, are, and was		0:06:13	0:06:13	100.00
8/23/07 p.m	Unit 3	3.1	Word search and spelling practice with who, any, all		0:02:46	0:02:46	100.00
8/23/07 p.m	Unit 4	4.1	Word search and spelling practice with said, once, and does		0:03:11	0:03:11	100.00
8/23/07 p.m	Unit 5	5.1	Word search and spelling practice with give, live, and from		0:03:49	0:03:49	100.00
8/23/07 p.m.	Unit 6	6.1	Word search and spelling practice with come, some, and done	Error scored for clicking on word search out of order	0:03:47		95.00
8/24/07 a.m.	Unit 6	6.2	Word search and spelling practice with come,		0:03:55		100.00

	Unit	Set	Description of Skill Required	Record of Errors	Time	Time/ Unit	Average Percentage
			some, and done				
Total Time	Unit 6					0:07:42	
8/24/07 a.m.	Unit 7	7.1	Word search and spelling practice with have, gone, and many	Error due to inadequate explanation of task	0:03:58	0:03:58	95.00
8/24/07 a.m.	Unit 8	8.1	Word search and spelling practice with were, want, and what		0:04:45	0:04:45	100.00
8/24/07 a.m.	Unit 9	9.1	Word search and spelling practice with says, half, and sure		0:04:12	0:04:12	100.00
8/24/07 a.m.	Unit10	10.1	Word search and spelling practice with they, busy, and very	No error observed	0:04:18	0:04:18	95.00
8/24/07 a.m.	Unit 11	11.1	Word search and spelling practice with been, none, and only		0:04:29	0:04:29	100.00
Sight Words Totals					0:54:08	0:04:55	
2-Syllable Words 8/24/07 a.m.	Unit 1	1.1	Construction of 2 syllable words		0:03:55	0:03:55	100.00
8/24/07 a.m.	Unit 2	2.1	Construction of 2 syllable words		0:04:36	0:04:36	100.00
2-Syllable Words Totals					0:08:31	0:04:15	
Sentences & Paragraphs 8/24/07 p.m.	Unit 1	1.1	Cloze sentences and paragraphs of increasing complexity		0:00:50	0:00:50	100.00
8/24/07 p.m.	Unit 2	2.1	Cloze sentences and paragraphs of increasing complexity		0:03:44	0:03:44	100.00
8/24/07 p.m.	Unit 3	3.1	Cloze sentences and paragraphs of increasing complexity		0:01:47	0:01:47	100.00
8/24/07 p.m.	Unit 4	4.1	Cloze sentences and paragraphs of increasing complexity		0:00:49	0:00:49	100.00
8/24/07 p.m.	Unit 5	5.1	Cloze sentences and paragraphs of increasing complexity		0:00:45	0:00:45	100.00
8/24/07 p.m.	Unit 6	6.1	Cloze sentences and paragraphs of increasing complexity		0:01:30	0:01:30	100.00
8/24/07 p.m.	Unit 7	7.1	Cloze sentences and paragraphs of increasing	snack for	0:02:54	0:02:54	83.00

	Unit	Set	Description of Skill Required	Record of Errors	Time	Time/ Unit	Average Percentage
			complexity	snake			
8/24/07 p.m.	Unit 8	8.1	Cloze sentences and paragraphs of increasing complexity	chunk	0:02:51	0:02:51	80.00
8/24/07 p.m.	Unit 9	9.1	Cloze sentences and paragraphs of increasing complexity	core for care	0:05:35		80.00
8/24/07 p.m.	Unit 9	9.2	Cloze sentences and paragraphs of increasing complexity		0:00:58		100.00
Total Time	Unit 9					0:06:33	
8/24/07 p.m.	Unit 10	10.1	Cloze sentences and paragraphs of increasing complexity		0:04:58	0:04:58	100.00
8/24/07 p.m.	Unit 11	11.1	Cloze sentences and paragraphs of increasing complexity		0:03:21	0:03:21	100.00
8/27/07 a.m.	Unit 12	12.1	Cloze sentences and paragraphs of increasing complexity		0:05:00	0:05:00	100.00
8/27/07 a.m.	Unit 13	13.1	Cloze sentences and paragraphs of increasing complexity		0:05:26	0:05:26	100.00
8/27/07 a.m.	Unit 14	14.1	Cloze sentences and paragraphs of increasing complexity		0:05:27	0:05:27	100.00
8/27/07 a.m.	Unit 15	15.1	Cloze sentences and paragraphs of increasing complexity		0:06:02	0:06:02	100.00
8/27/07 a.m.	Unit 16	16.1	Cloze sentences and paragraphs of increasing complexity		0:02:48	0:02:48	100.00
8/27/07 a.m.	Unit 17	17.1	Cloze sentences and paragraphs of increasing complexity		0:06:23	0:06:23	100.00
8/27/07 p.m.	Unit 18	18.1	Cloze sentences and paragraphs of increasing complexity	Help for take	0:02:58	0:02:58	80.00
8/27/07 p.m.	Unit 19	19.1	Cloze sentences and paragraphs of increasing complexity	flash for fresh	0:05:35		80.00
8/27/07 p.m.	Unit 19	19.2	Cloze sentences and paragraphs of increasing complexity		0:00:48		100.00
Total Time	Unit 19					0:06:23	
8/27/07 p.m.	Unit 20	20.1	Cloze sentences and paragraphs of increasing complexity		0:04:25	0:04:25	100.00
Sen. & Para. Totals					1:14:54	0:03:45	
Vowel	Unit 1	1.1	Choose between “ee” and “ai” with aural		0:01:54	0:01:54	100.00

	Unit	Set	Description of Skill Required	Record of Errors	Time	Time/ Unit	Average Percentage
Digraphs 8/27/07 p.m.			presentation of sounds				
8/27/07 p.m.	Unit 2	2.1	Spell each word by selecting the appropriate letter combinations (“oa,” “ee,” “ai”)		0:04:18	0:04:18	100.00
8/27/07 p.m.	Unit 3	3.1	Spell each word by selecting the appropriate letter combinations (“igh,” “ai,” “oa”)		0:02:42	0:02:42	100.00
8/27/07 p.m.	Unit 4	4.1	Spell each word by selecting the appropriate letter combinations (“ay,” “oa,” “igh”)	bright	0:02:02	0:02:02	100.00
8/27/07 p.m.	Unit 5	5.1	Spell each word by selecting the appropriate letter combinations (“oa,” “ee,” “ai”, “igh”)		0:07:54	0:07:54	100.00
8/27/07 p.m.	Unit 6	6.1	Spell each word by selecting the appropriate letter combinations (“oi,” “ay,” “ee”)		0:01:32	0:01:32	100.00
8/29/07 a.m.	Unit 7	7.1	Spell each word by selecting the appropriate letter combinations (“oy,” “oa,” “igh”)	throat	0:02:05	0:02:05	92.00
8/29/07 a.m.	Unit 8	8.1	Spell each word by selecting the appropriate letter combinations (“ow,” “oy,” “ay”)	stray	0:01:52	0:01:52	96.00
8/29/07 a.m.	Unit 9	9.1	Spell each word by selecting the appropriate letter combinations (“au,” “ee,” “oi”)	vault, maul	0:04:03		92.00
8/29/07 a.m.	Unit 9	9.2	Spell each word by selecting the appropriate letter combinations (“au,” “ee,” “oi”)	gauze	0:02:03		96.00
8/29/07 a.m.	Unit 9	9.3	Spell each word by selecting the appropriate letter combinations (“au,” “ee,” “oi”)	haul (2x)	0:02:34		92.00
8/29/07 a.m.	Unit 9	9.4	Spell each word by selecting the appropriate letter combinations (“au,” “ee,” “oi”)	clause, cause, gauze	0:02:03		94.00
Total Time	Unit 9				0:35:02	0:10:43	
Vowel Digraphs Totals					1:10:04	0:03:54	

APPENDIX H

MISCUE ANALYSIS FOR THE QRI-3 PASSAGES

Pre-Assessment

Narrative Text: Christopher Columbus

	Miscue	Text	Self-Corrected	Meaning Changing	Similar Onset	Similar Ending
1	Rotate	Route	No	Yes	Yes	Yes
2	West	East	No	Yes	No	Yes
3	Discovered	Discovering	No	Yes	Yes	No
4	The	This	No	Yes	Yes	No
5	World	Would	No	Yes	Yes	Yes
6	Helped	Hoped	No	Yes	Yes	Yes
7	The order	Theory	No	Yes	Yes	No
8	Was	Would	Yes	No	Yes	No
9	Seal	Sail	Yes	No	Yes	Yes
10	_____	Ferdinand	(Supplied)	Yes	N/A	N/A
11	_____	Merit	(Supplied)	Yes	N/A	N/A
12	Coastly	Costly	No	Yes	Yes	Yes
13	_____	Long	No	Yes	N/A	N/A
14	_____	Expedition	(Supplied)	Yes	N/A	N/A
15	Soldiers	Sailors	No	Yes	Yes	Yes
16	How	Who	No	Yes	No	No
17	Them	Him	No	Yes	Yes	Yes
18	_____	Uncharted	(Supplied)	Yes	N/A	N/A
19	_____	Unexplored	(Supplied)	Yes	N/A	N/A
20	Soldiers	Sailors	No	Yes	Yes	Yes
21	_____	Maria	No	No	N/A	N/A
22	Soldiers	Sailors	No	Yes	Yes	Yes
23	Out	_____	No	No	N/A	N/A
24	Close	_____	No	No	N/A	N/A

	Miscue	Text	Self-Corrected	Meaning Changing	Similar Onset	Similar Ending
25	And	No	No	Yes	No	No
26	This	One	No	Yes	No	No
27	Soldiers	Sailors	No	Yes	Yes	Yes
28	Mounty	Mutiny	No	Yes	Yes	Yes
28	Had	Would	No	Yes	No	Yes
30	Soldiers	Sailors	No	Yes	Yes	Yes
31	Treated	Threatened	No	Yes	Yes	Yes
32	Soldiers	Sailors	No	Yes	Yes	Yes
33	1422	1492	No	yes	Yes	Yes
34	The	That	No	yes	Yes	No
35	From	For	No	yes	Yes	No
36	Tribe	Inhabitants	No	Yes	No	No
37	They	he	no	Yes	No	No

Expository Text: The Octopus

	Miscue	Text	Self-Corrected	Meaning Changing	Similar Onset	Similar Ending
1	fic	fiction	Yes	No	Yes	No
2	already	really	No	Yes	No	No
3	quiet	quite	No	Yes	Yes	No
4	Arms	Legs	No	Yes	No	No
5	it	this	No	Yes	No	No
6	_____	eight	No	Yes	N/A	N/A
7	usually	uses	No	Yes	Yes	No
8	is	are	No	Yes	No	No
9	_____	to	No	Yes	N/A	N/A
10	the	its	No	No	No	No
11	bite	beak	No	yes	Yes	No
12	if	this	No	No	No	No
13	the	_____	No	No	N/A	N/A
14	into	in	No	No	Yes	No
15	storm	stream	No	Yes	Yes	No
16	its	this	No	No	No	No
17	it	this	No	No	No	No
18	is	has	No	Yes	No	Yes
19	thing	sac	No	Yes	No	No
20	it	that	No	No	No	Yes
21	the	an	No	No	No	No
22	army	enemy	No	Yes	No	Yes
23	squire	squirts	No	Yes	Yes	No
24	one	_____	No	Yes	N/A	N/A
25	its	this	No	No	No	No
26	produce	predator	No	Yes	No	No
27	was	has	No	No	No	Yes
28	then	when	No	No	No	Yes
29	patching	patches	Yes	No	Yes	No
30	and	or	No	Yes	No	No
31	all	will	No	Yes	No	Yes
32	enen	enemy	No	Yes	Yes	No
33	comple	completely	No	Yes	Yes	No
34	is	it	Yes	No	Yes	No
35	produce	predator	No	Yes	Yes	No

End of Phase 1 Assessment

Narrative Text: Martin Luther King, Jr.

	Miscue	Text	Self-Corrected	Meaning Changing	Similar Onset	Similar Ending
1	Did	Would	No	No	No	yes
2	Contain	Certain	No	Yes	Yes	Yes
3	The	a	No	No	No	No
4	_____	And	No	No	N/A	N/A
5	This	These	No	No	Yes	No
6	Because the	that	No	Yes	No	No
7	Started	separating	No	Yes	Yes	No
8	each	such	No	No	No	Yes
9	law	laws	No	No	Yes	No
10	Keep King as the as	Him	No	Yes	No	No
11	The	A	No	No	No	No
12	Mesographicly	Montgomery	No	Yes	Yes	Yes
13	Has	was	No	Yes	No	No
14	Intend	arrested	No	Yes	No	No
15	to	and	No	Yes	No	No
16	Lived	Led	No	Yes	Yes	Yes
17	In	The	No	Yes	No	No
18	morment	movement	No	Yes	Yes	Yes
19	Of	to	No	Yes	No	No
20	In	this	No	Yes	No	No
21	Buses	bus	No	No	Yes	No
22	Contic contain	companies	No	Yes	Yes	No
23	Laws	law	No	No	Yes	No
24	They	he	Yes	No	No	No
25	_____	The	No	No	N/A	N/A
26	King	King’s	No	No	Yes	No
27	people	Peaceful	Yes	No	Yes	No
28	protest	protests	No	No	Yes	No
29	droves	joined	No	Yes	No	No
30	Of	To	No	Yes	No	No
31	for	Of	No	No	No	No
32	as	to	No	Yes	No	No
33	our	ask	No	Yes	No	No
34	Charged	Changed	No	Yes	Yes	Yes
35	Separate	Separating	No	Yes	Yes	No
36	Change	_____	Yes	No	N/A	N/A
37	People	_____	Yes	No	N/A	N/A

	Miscue	Text	Self-Corrected	Meaning Changing	Similar Onset	Similar Ending
	Miscue	Text	Self-Corrected	Meaning Changing	Similar Onset	Similar Ending
38	of	He	No	Yes	No	No
39	Fight	fought	No	Yes	Yes	Yes
40	January	_____	Yes	No	N/A	N/A

Expository Text: Getting Rid of Trash

#	Miscue	Text	Self-Corrected	Meaning Changing	Similar Onset	Similar Ending
1	part	past	No	Yes	Yes	Yes
2	throw	threw	No	Yes	Yes	No
3	Uh/or/and	out	No	Yes	No	No
4	throw	threw	No	Yes	Yes	No
5	_____	or	No	Yes	No	No
6	_____	alleys	No	Yes	No	No
7	put	packed	No	Yes	Yes	No
8	_____	a	No	No	No	No
9	wagons	wagon	No	No	Yes	No
10	by	near	No	No	No	No
11	and	that	No	Yes	No	No
12	disease	diseases	No	No	Yes	No
13	got	get	No	No	Yes	No
14	_____	open	No	Yes	No	No
15	_____	is	No	Yes	No	No
16	the	and	No	Yes	No	No
17	get	getting	No	Yes	Yes	No
18	burning	buildings	No	Yes	Yes	No
19	to	of	No	No	No	No
20	get	getting	No	No	Yes	No
21	another	_____	Yes	No	No	No
22	_____	down on air	No	Yes	No	No
23	_____	incinerators	No	Yes	No	No
24	gathered	gather	No	No	Yes	No
25	the	this	No	No	Yes	No
26	business	businesses	No	No	Yes	No
27	charge	changing	No	Yes	Yes	No
28	they	this	Yes	Yes	Yes	No
28	or	and	No	Yes	No	No
30	they	this	No	No	Yes	No
31	cut	cuts	No	No	Yes	No

End of Phase 1 Assessment

Narrative Text: Margaret Mead

	Miscue	Text	Self-Corrected	Meaning Changing	Similar Onset	Similar Ending
1	On	In	No	No	No	Yes
2	_____ (decoding with minor assistance)	Anthropology	No	Yes	Yes	Yes
3	A	her	No	No	No	No
4	courier	career	No	Yes	Yes	Yes
5	(decoding with minor assistance)	modern	No	Yes	Yes	Yes
6	Her	their	No	Yes	No	Yes
7	Nonsense “c” word	culture	No	Yes	Yes	No
8	A	the	No	Yes	No	No
9	Samea	Samoa	No	No	Yes	No
10	Indians	islands	No	Yes	Yes	Yes
11	Made	make	No	No	Yes	No
12	Samea	Samoan	No	No	Yes	No
13	_____	languagel	No	Yes	N/A	N/A
14	ceremonial	ceremonies	No	Yes	Yes	No
15	or	and	No	Yes	No	No
16	fighting	fluent	No	Yes	Yes	No
17	flint	fluent	No	Yes	Yes	Yes
18	replated	regarded	No	Yes	Yes	Yes
1	_____	learned	No	Yes	N/A	N/A

9						
20	no	to	No	Yes	No	No
21	_____	an	No	Yes	N/A	N/A
22	keep	kept	No	Yes	Yes	v
23	to	of	No	No	No	No

Expository Text: Laser Light

#	Miscue	Text	Self-Corrected	Meaning Changing	Similar Initial	Similar Ending
1	A		NO	NO	NO	NO
2	_____	light	No	No	No	No
3	beginning	being	Yes	No	Yes	Yes
4	machine	medicine	No	Yes	Yes	Yes
5	induty	industry	No	Yes	Yes	No
6	cutally	actually	No	Yes	No	Yes
7	waves	wavelengths	No	No	Yes	No
8	_____ (lost place)	All the same wavelengths (14 words)	No	Yes	No	No
9	a	_____	No	No	No	No
10	_____	Because	No	Yes	No	No
11	language	length	No	Yes	Yes	No
12	_____ (lost place)	(29 words)	No	Yes	No	No
13	used	useful	Yes	No	Yes	No
14	machine	messages	No	Yes	Yes	No
15	c_____	people	No	Yes	No	No
16	one	a	No	No	No	No
17	nonsense?	accident	No	Yes	No	No
18	_____ (3 words)	reattach the retina	No	Yes	No	No
19	_____	tumors	No	Yes	No	No
20	beginning	being	No	Yes	Yes	Yes
21	the	this	No	No	Yes	No

APPENDIX I

WORD SUBSTITUTIONS ON THE FRY INSTANT WORDS CRITERION TEST

Pre-Assessment

First 100 Words		Second 100 Words		Third 100 Words	
Fry Word	Substitution	Fry Word	Substitution	Fry Word	Substitution
has	was	same	some	own	our
look	took	form	from	thought	though
		does	get	close	glow
		men	man	often	oven
		try	they	run	ran
		away	always	side	slide
		point	port	talk	take
		world	word		

Phase One: Lexia Without Tutoring

First 100 Words		Second 100 Words		Third 100 Words	
Fry Word	Substitution	Fry Word	Fry Word	Substitution	Fry Word
				own	oin
				side	slide
				leave	leaf

Phase Two: Lexia With Tutoring

First 100 Words		Second 100 Words		Third 100 Words	
Fry Word	Substitution	Fry Word	Substitution	Fry Word	Substitution
word	world	new	noun	own	on
use	us	know	now	thought	though
which	with	through	though	those	these
other	another	same	some	side	slide
would	world	form	from	mile	mail
who	how	because	before	far	fair
		here	where there	young	younger
		why	way		
		men	man		
		try	they		
		spell	spill		