2003

An evaluation of distributed practice using constant time delay in the acquisition of sight words with children

Kashunda Lynn Williams
Louisiana State University and Agricultural and Mechanical College, kvicks1@lsu.edu

AN EVALUATION OF DISTRIBUTED PRACTICE USING CONSTANT TIME DELAY IN THE ACQUISITION OF SIGHT WORDS WITH CHILDREN

A Thesis

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Master of Arts

in

The Department of Psychology

by
Kashunda L. Williams
B.S. Louisiana State University, 2001
December 2003

Acknowledgments

I would like to thank Dr. George H. Noell for his support and guidance in the preparation of this document. I would also like to thank Dr. Joseph Witt and Dr. Kristin Gansle who served as my committee members. Lastly, I would like to thank all that aided in data collection and the implementation of the study s intervention.

Table of Contents

List of Tables

List of Figures

Abstract

Although, distributed practice has been demonstrated to be superior to massed practice for learning, studies examining the degree of distribution needed to obtain this effect remain lacking. This study extends prior research by (1) determining if there is a difference in distributed practice schedules, when the total time to practice remains constant, (2) determining which schedule produces the superior amount of learning, and (3) determining which schedule produces superior retention of learned materials across time. Study participants were general education elementary school students referred for reading assistance. The constant time delay procedure was used to teach the participants sight words. Efficacy of the teaching schedules was evaluated across different word sets and a control set in an adapted alternating treatments design. Data were collected through the six-week intervention and at a two-week follow-up. Results indicated for these participants on this task twice per week and four times per week were similarly effective and that these schedules were more effective than practice occurring once per week. When differences emerged for follow-up data practice four times per week was superior. These results suggest that there may there are differences between distributed practice schedules for some students and outcomes, but clearly additional research is clearly needed in this area. This is an important area of investigation for school psychologists because of its implications for the design of prereferral interventions and IEPs.

Introduction

Much has been written concerning massed versus distributed practice. With the overwhelming amount of evidence supporting distributed practice, it is natural to question the value of yet another study on this topic (Grote, 1995). Even though the spacing of learning sessions has already received considerable experimental investigation, the question of optimal spacing has not been solved. For example, assume that there are five days to teach a student a skill, and you can only work with the child for a total of 60 minutes. During the days allowed, which practice schedule would produce the best results? You could perform the intervention in one 60-minute session or once each day for12 minutes a session. There are various other combinations of session lengths and number of sessions to choose from. The first extreme would be called massed practice (one-60 minute session), and the others would be considered forms of distributed practice. From a practical view point, the lengths and number of sessions to practice are limited. This limitation can be attributed to the student s school schedule, and/or to the schedule of the practitioner. Additionally, individual differences should be taken into account. Everyone has a different rate of learning, thus there is no one distributed schedule that will produce the best results for all students. But, the question remains, Do different distributed schedules effect the amount of information learned, and if so, how distributed should practice be in order to allow for the maximum amount of learning?

Massed and Distributed Practice Literature Review

The spacing effect refers to the finding that items with repetitions that are separated by time or other events are remembered better than items with repetitions that are massed, occurring in immediate succession (Toppino & Schneider, 1999). A review of the spacing effect by Dempster (1988) noted that in the past 100 years the spacing effect has been found across several

different types of material, including text. In spite of the vast amount of research focusing on this phenomenon, there has been no generally accepted theoretical explanation as to why the spacing effect occurs. Although a variety of theoretical mechanisms have been proposed to account for the spacing effect, most accounts have been based on some variation of either a deficient-processing or an encoding-variability mechanism. According to deficient-processing theories (e.g. Challis, 1993; Jacoy, 1978; Rose & Rowe, 1976; Shaughnessy, Zimmerman, & Underwood, 1972), learners do not study fully one presentation of a massed repetition (usually the second), whereas they are more likely to study fully both presentations of a speed repetition. Proponents of these theories attribute the superiority of spaced repetitions to greater total study time and/or quality. According to encoding-variability theories (e.g., Bower, 1972; Glenberg, 1976, 1979; Madigan, 1969), massed repetitions are likely to be encoded similarly, whereas spaced repetitions are likely to be encoded differently, enabling a greater number of effective retrieval cues. Thus, proponents of these theories attribute the superiority of spaced repetitions to the greater accessibility of differentially encoded information. The lack of a theoretical consensus does not reflect a lack of empirical effort. The spacing-effect literature is voluminous. Countless variables have been manipulated in the course of investigating the spacing effect in a wide variety of memory tasks (Crowder, 1976, & Hintzman, 1974). However, the basic phenomenon has been replicated repeatedly, but the boundaries of the spacing effect have proved to be exceedingly difficult to identify, so no existing theory can account for all of the relevant findings. More specifically, there has been no broadly agreed-upon theoretical account of why the spacing effect occurs with reading materials. Many researchers would consider this effect to be among the best established phenomena in the area of learning and memory (Dempster, 1988).

Research by Lesgold et al. (1988) found that the development of expert knowledge structures is a slow process. From a cognitive information processing approach it might be agreed that individuals must abstract principles from new experiences through deep or elaborative processing. The abstraction of principles, however, is also likely to be time

consuming and demanding (Chi et al., 1989; Schooler, 1990). As a result, application of general cognitive abilities in the development of knowledge structures may require distributed practice, easing the burden placed on the learner and providing the time required for application of cognitive abilities.

Distributed practice is a technique in which the student is exposed to the materials to be learned in a number of separate instances. In massed practice, there is only one, comparatively lengthy exposure to the materials (Grote,1995). Experimental evidence indicates that, for the same amount of practice, learning is better when practice is distributed rather than massed (Fishman, Keller, & Atkinson, 1968).

One might argue that distributed practice provides students the time (i.e., repeated exposures) that they need to work with new material and thus contributes to learning and performance when the task at hand stresses knowledge structure development (Dempster, 1987). Accordingly, Bloom & Shuell (1981) found that high school students learned French vocabulary more effectively when they were asked to distribute their practice. Other studies have also demonstrated the superiority of distributed practice on cognitive tasks ranging form statistical operations (Smith & Rothkopf, 1984) to computer video games (Metalis, 1985).

The Metalis study investigated the effects of massed versus distributed practice on the learning of video game playing skills. Forty-five subjects, both males and females, participated. The subjects were randomly assigned to either massed or distributed practice groups. In the massed group, each subject played the video game 10 times in succession. Subjects given distributed practice received a newspaper to read for 2 minutes between the 10 repeated games (trials). Points earned for each of the 10 games were recorded. The mean indexes, computed across subjects for each of the game scores, showed marked improvement for all subjects.

However, the results showed that the distributed practice scores were higher, and showed more improvement, than the scores under massed practice.

In still another study, Krug, Davis, & Glover (1990) examined the effects of massed and distributed practice, and found that distributed practice lead to better performance. They argued that distributed practice provided students with the time they needed for the kind of deep, elaborative processing required to paraphrase reading material.

Grote (1995), examined the spacing effect in a setting that would be relevant to science teachers. The participants were 41 students, nearly equal number of males and females, in two suburban high school physics classes. All students were exposed to both massed and distributed practice on two different physics topics. Students in two physics classes were taught lessons on Hooke s law and the string laws on consecutive days. Students were randomly assigned to either Group S, which received massed practice on string laws, or Group H, which received massed practice on Hooke s law. Random assignment of students within classes controlled for any differences that might have existed between the classes. Each group of students completed a packet of 60 problems and questions. The massed packets were cut and rearranged as a series of 20 short practice sheets. Each day for the next four weeks, Group H received a short practice sheet of three problems/ questions on the string laws. Group S received a short practice sheet of three problems/ questions on Hooke s law.

Two weeks after the completion of the distributed practice, a 40-question multiple choice test was administered to all students. Questions involved both recall and problems. There were 20 questions concerning the string laws and 20 concerning Hooke s law. The same test was also given after four and six weeks. The basic design of the study was a repeated measure analysis

with one between (physics achievement) and two within (treatment and time) factors. The analysis of the data were done using a MANOVA. Results suggested that, distributed practice produced superior achievement as measured by the test instrument. Both higher-achieving and lower-achieving students benefitted from the distributed practice treatment. The superior mastery of the material by students who had distributed practice was nearly constant over a period of six weeks. The significance difference between the distributed practice and the massed practice groups indicated that distributed practice could be used to increase students retention of material without an increase in time. These findings were the same for both high and low achievers.

There are occasional exceptions to the generalization that learning is better when practice is distributed rather than massed. A study by Blake (1976) showed dissimilar results. The study s purpose was to examine retarded and normal students use of massed and distributed practice in learning sight vocabulary. Treatment 1 was massed practice in which 12 trials were given in one sitting. Treatment 2 was distributed practice in which sets of 4 trials were given each week for three successive weeks. The materials to be learned consisted of the shorthand symbols for 12 words. To assess the symbols the experimenter used multiple choice tests. The experimenter read the stimulus aloud and the subjects circled their choices from among the four alternatives. The number of correct choices circled was measured. The results showed that subjects using the massed practice reached a higher level at a slightly faster rate than those using distributed practice.

Although the author came to this conclusion, there was one major limitation in the study. The study was presented in the style of a brief report. This was limiting, because so many

important details were not provided. When challenging such well established ideas sufficient evidence should be provided to show clear support of your data. Also, there was no mention of follow-up testing to demonstrate generalization across time.

A study by Fishman, Keller, and Atkinson (1968), explored the conditions of massed and distributed practice by using a within-subjects design in a situation involving computerized spelling drills. The authors state their purpose as attempting to investigate massed versus distributed practice and evaluating optimum procedures for distributing learning instructional material in computer based spelling drills. The focus of the study remained on the topic of massed and distributed practice, and the evaluation of the optimum procedures for distributing learning was never addressed by the authors. This is the only article found, (i.e., by searching PsycINFO and ERIC) which makes a reference to the procedures associated with distributed practice sessions.

In there study, 29 student participants from a fifth-grade class in East Palo Alto school. Approximately, 50% of the students scored below grade level on standardized reading tests, and 20% of them were reading at the second and third grade level. The authors did not state the standardized tests used.

The experiment involved a within-subjects design, (i.e., each participant participated in all conditions). The two main conditions were those of massed and distributed practice. There were eight sets of words: six of them were massed and two were distributed. In the distributed condition, two sets of three words each were presented once every other day over a period of six days. The learning trials on six other sets of words were massed so that all of the trials for that set occurred on the same day.

The major results of the experiment were that the probability of a correct response for words in the massed condition was higher than that for the distributed condition during learning sessions. But, on the retention tests, given 10 and 20 days later, the words learned under distributed practice were better remembered. Thus, it appears that in the long run more learning occurs when repetitions of an item are well distributed.

As noted above, the spacing of learning sessions has received considerable experimental investigation, yet the question of optimal spacing has not been resolved.

Constant Time Delay Literature Review

In order to determine the optimal spacing of practice sessions, an effective and efficient instructional procedure should first be established. A number of effective teaching practices and strategies have been developed. Effective teaching procedures include response prompting strategies such as progressive (increasing assistance) and constant time delay (Handen & Zane, 1987), system of least prompts (Dolye, Wolery, Ault, & Gast, 1988), and most-to-least prompting (decreasing assistance)(Billingsley & Romer, 1983).

In the past, research has been conducted to determine which of theses procedures is the most effective and efficient. Two investigations (Bennet, Gast, Wolery, & Schuster, 1986; Godby, Gast, & Wolery, 1987) have compared progressive time delay (PTD) and the system of least prompts (SLP). Progressive time delay involves initial presentation of 0-second delay trials followed by gradual increases in the response interval between the presentation of the target stimulus and controlling prompt (Handen & Zane, 1987; Snell & Gast, 1981). The system of least prompts involves presentation of a prompt hierarchy (ordered from least to most intrusive prompts) on each training trial (Cronin & Cuvo, 1979; Doyle, Wolery, Ault, & Gast, 1988).

These two procedures were both effective, but progressive time delay produced fewer sessions, trials, errors, and minutes of direct instruction time to criterion (Bennett et al., 1986; Godby et al., 1987). When constant and progressive time delay were compared, both were found effective and efficiency was roughly equal (Ault, Gast, & Wolery, 1988).

Doyle, Wolery, Gast, and Ault (1990), compared the effectiveness and efficiency of constant time delay (CTD) and the system of least prompts (SLP) in teaching sight words to developmentally delayed preschoolers. The investigation had several purposes: (a) to compare the effectiveness of constant time delay and the system of least prompts with preschool children displaying developmental delays; (b) to compare the efficiency of the two procedures in terms of trials, errors, percent of errors, and minutes of instructional time; (c) to assess the effects of the two procedures in terms of maintenance; (d) to compare the effects of the two procedures in terms of generalization across instruction and stimuli, and (e) to compare the two procedures in terms of the acquisition of stimulus equivalence relationships.

The data indicated that each procedure was effective in teaching 8 words to two of the participants and 6 words to one participant. An analysis of the number of trials, errors, percent of errors, and minutes of direct instruction time through criterion produced three findings. First a learning-to-learn effect appeared to occur across word sets, that is, learning occurred on the basis of one or few examples and the learned material transferred to different situations. This finding is consistent with earlier research with these procedures (Gast et al., 1988).

Second, based on the totals across subjects, the efficiency differences appeared to be substantial in that the CTD procedure required 20% less instructional time than SLP, and SLP procedure resulted in more than four times as many errors. This is consistent with other direct

comparisons of CTD and SLP with elementary-aged children with moderate mental retardation (Gast et al., 1988) and autism (Ault, Gast, Wolery, Doyle, & Eizenstat, 1988).

Third, although the totals for the efficiency measures show that the CTD procedure was more efficient, the differences were noted primarily with the first word set. Despite the history training, these children appeared to need additional experience with SLP before being able to learn efficiently from it. Because the data are similar in word sets taught after the initial set, the two procedures may produce equally efficient learning once students have learned to use the procedures. Nonetheless, the simplicity of CTD argues for the adoption of this procedure over SLP.

Similar findings were found in the Gast, Ault, Wolery, Doyle, & Belanger, 1988 study. They also, compared constant time delay (CTD) to the system of least prompts (SLP). They used the procedures in teaching discrete responses to elementary-aged students who exhibited moderate mental retardation. Their results also suggested that both procedures were effective, and that constant time delay (CTD) was more efficient. Considerable evidence exists that constant time delay is one of the most effective and efficient instructional strategies available to teach individuals with moderate and severe disabilities (Ault, Wolery, Doyle, & Gast, 1989). Because time delay requires no special materials, it is simpler for some teachers to use than a task demonstration model or other variations of stimulus shaping or fading.

The constant time delay procedure involves two types of trials, 0-second trials and delay trials. The 0-second trials are presented during initial instruction and involve delivery of the target stimulus followed immediately by a response prompt (called a controlling prompt) which ensures the student will respond correctly after use of the 0-second trials. This is usually a

teacher behavior that ensures a correct student response (Wolery, Ault et al., 1992, P. 240). The delay trials involve inserting a fixed number of seconds (e.g., 3, 4, or 5 s) between delivery of the target stimulus and the controlling prompt. These trials remain in effect until performance reaches criterion levels. The CTD procedure introduces and subsequently fades prompts for the purpose of maximizing correct responses and minimizing student errors (Snell & Gast, 1981; Touchette, 1971).

Consequently five types of responses are possible. They include unprompted correct, prompted correct, unprompted errors, prompted errors, and no response. Unprompted correct occurs when a student responds before the controlling prompt. Prompted correct occurs when a student responds correctly after the controlling prompt. Unprompted errors occurs when the student responds incorrectly before the prompt, while prompted errors occurs when a student emits an error after the controlling prompt. Finally, a no response occurs when the student does not respond after the controlling prompt.

Wolery, Holcombe, et al. (1992) reviewed 36 articles that reported the use of constant time delay to teach discrete tasks. They defined discrete tasks as behaviors that [have] a relatively short duration, (are) taught as a single unit, and [do] not involve a task analysis (p. 242). Tasks such as sight word reading, spelling, and manual signing are examples of discrete tasks that were thought with constant time delay. Overall, Wolery, Holcombe, et al. found that the constant time delay procedure had been effective in teaching a variety of skills to students with a wide range of handicapping conditions. These include manual signing by secondary-age students and adults with moderate to severe retardation (Bowder, Morris, & Snell, 1981; Kleinert & Gast, 1982); numeral identification by elementary-age

students with autism (Ault, Wolery, Gast, Doyle, & Eizenstat, 1988); sight word reading by pre-schoolers with developmental delays (Cybriwsky, Wolery, & Gast, 1990) and elementary students with moderate retardation (Gast, Ault, Wolery, Doyle, & Belanger, 1988); spelling by students with learning disabilities (Kinney, Stevens, & Schuster, 1988; Steven & Schuster, 1987); numerical identification (Ault et al., 1988); stating factual information by junior high school students with learning and behavior disabilities (Wolery, Cybriwsky, Gast, & Boyle-Gast, (1991); and community living skills such as cooking (Schuster, Gast. Wolery, & Guiltinan, 1988), purchasing (McDonnell, 1987), laundry skills (Miller & Test, 1989) and banking to secondary age students with moderate and severe retardation (Mc Donnell & Ferguson, 1989) . Also, the CTD procedure has been used to teach self-help skills (Schoen & Sivil, 1989), language use (Halle, Marshall, & Spradlin, 1979), vocabulary words (Keel& Gast, 1992), and social studies and health facts (Wolery, Cybriwsky, Gast, & Boyle-Gast, 1991), among others. The procedure has also, been used with a varied population. The procedure has been used successfully to teach students with learning disabilities (Stevens & Schuster, 1987), mental retardation (Ault, Gast, & Wolery, 1988), autism (Ault, Wolery, Gast, Doyle, & Eizenstat, 1988), multiple disabilities (Wolery, Ault et al., 1992), and developmental disabilities (Schoen & Sivil, 1989).

A study by Schoen & Ogden (1995) examined the effects of constant time delay, observational learning opportunities, and differential attentional cuing during small-group instruction of students in an integrated setting. Three students, one individual with moderate mental retardation and two individuals characterized as at risk learners, participated in learning sight words through direct instruction and observational-learning conditions. A multiple probe

design across three students was combined with a multielement design across treatment conditions to assess the impact of instructional variables.

Data were examined in terms of the relative effect of an intervention package that incorporated a response prompt produced procedure (CTD) and the comparative effects of attentional cuing strategies upon direct and observational learning in order to answer these questions: (a) is the intervention package that incorporates CTD an effective response-prompt procedure for small-group instruction of young students with diverse learning characteristics in inclusive settings, and (b) will disparate attentional cuing strategies differentially effect direct as well as observational learning across students with diverse abilities? The relative effects of the intervention suggest that young children with diverse abilities can readily acquire sight words under the response prompt of constant time delay. Findings also support the salience of the constant time delay (CTD) procedure in facilitating word acquisition in small, heterogenous, and inclusive group learning arrangements.

In sum, this study is important, because it provides further support for the effectiveness, efficiency, and applicability of employing the response prompt procedure of constant time delay within an intervention package to teach sight words to young students of diverse abilities in small-group learning arrangements. Because it is strongly supported in the literature as an effective and efficient intervention procedure, which has been used across populations and deficits, constant time delay has been chosen as the intervention of this investigation.

Sight Word Literature Review

Reading has been identified as one of the most critical issues facing a significant number of children (Reid & Hresko, 1981). The constant time delay procedure has been used as a

successful method in teaching a number of reading related skills, which include sight words acquisition (Keel& Gast, 1992, Wolery et al, 1990, Schuster et al., 1992). The current study will focus on determining the optimal spacing of practice sessions using the constant time delay procedure in a reading intervention. Bommarto (1978) stated that reading problems among children in elementary schools are severe, particularly in the area of word recognition skills. In order to be effective readers, children must be proficient in word recognition skills, and they cannot stop to analyze every word they encounter and at the same time read fluently.

There are several methods used to teach children to read. The notion that children learning to read should be taught a combination of recognizing whole words or sight words, and phonetics is supported by the National Reading Panel (2000). Whole word recognition refers to the identification of words as distinct graphic configurations, without any attempt to analyze the make-up of the word in relation to the spoken sound that it represents. Durkin (1972) states that, whole-word identification will enable a child to look at a word and say (think) it without going through any types of analyses. In reading sight words, Harris & Smith (1972) states, that children go through no evident analytic process as their eyes sweep across each word, and Karlin (1971) would agree that sight words are words which readers learn to recognize without having to analyze them. Decoding skills, used in phonetic learning, implies to the ability to discriminate between letters according to letter features, a knowledge of letter-sound relationships, ability to blend a number of separate sounds into a single syllable or word, and the awareness of spelling rules by which letter clusters are combined to form a phoneme or minimum unit of sound (Jenkinson, 1989).

The English language is not consistently phonetically regular. Some words, of course, can be sounded out and spelled phonetically. On the other hand, there are a number of common

sight words that are not spelled in an alphabetically regular manner. To achieve the goal of literacy, memorization of some whole words is necessary because the English language has these irregularities in spelling that do not lend themselves to phonetic analysis.

Sight words, it is said, are useful since they form the basis for studying phonetic and structural elements of words (Hafner & Jolly, 1972). Assumed advantages of sight words are that when the phonetic principles involved in reading are not yet within the child s grasp and he or she can use sight words immediately, that sight words give beginning readers early success, and that they aid in getting children reading immediately (Jones, 1971;Wallen, 1972). Through the acquisition of sight words, individuals can enhance their daily living and job skills. For example, sight words have been used for grocery shopping and household chores (Lalli & Browder, 1993), following instructions for cooking and other daily tasks (Browder, Hines, McCathy, & Fees, 1984), reading product warning labels (Collins & Stinson, 1995), and reading signs during community recreation (Schloss et al., 1995). Another benefit of sight words is that, they can be taught to a mixed population. For example, studies include participants with mild and moderate retardation (Cuvo & Klatt, 1992) or individuals who were dually diagnosed with mental retardation and emotional disturbances (Bowder & Shear, 1996).

Although beneficial to literacy or daily living, the acquisition of sight words can be a challenging task. From a behavioral perspective on sight word instruction, the learner masters words through discrimination training, and learning can be conceptualized as two complex skills (Skinner, 1957). First, the learner must make a multiple visual discrimination across letters of a printed word, and say the word. Second, he or she must generalize that visual discrimination to another activity, such as reading a passage or following a recipe.

The function of sight word instruction should be to promote literacy or to increase participation in daily living activities. In designing sight word instruction, teachers are encouraged to consider simplicity, as well as effectiveness.

As in the past, today s teachers of reading are told a major step of any reading program should be to train children to recognize a certain number of whole words (Groff, 1974). But, which words should be selected for teaching as sight words? Some say these words should be frequently used words (Fry, 1972). Harris & Smith (1972) agree, and regard sight words as high frequency words, ones that have irregular spelling patterns, and high emotional content. Still yet, Wilson & Hall (1972) designate sight vocabulary only as those words developed after a pre-reading period, a level at which the child learns to discriminate and name letters, match words, and to identify words which are different only in the initial, medial, or final letters. Recent literature supports the idea that sight words selected for teaching should share a combination of the above characteristics (Browder & Lalli, 1991).

The new Instant Word List complied by Edward Fry (1980) is based on a newer frequency count of five million running words done by Carrol, Davis, & Richman (1971). Fry explains that half of all written material in English is composed of just the first hundred Instant Words and their common variants. Fry goes on to say that an example of a common variant would be the adding of -s or -ing at the end of a base word. He states that, the 300 New Instant Words and their common variants make up 65% of all the words in any textbook, any newspaper, or any writing sample in English. He proposes that a beginning reader could read half of the words on any page of any textbook, newspaper, etc.. just by learning a list of 100 words. Hence, in his opinion, teaching these 100 words would be valuable.

Rationale and Purpose of the Current Study

This review suggests that distributed practice is superior when compared to massed practice, that constant time delay is an effective and efficient teaching procedure, and that the acquisition of sight words are an important factor of early reading. This study incorporates these three areas in hopes to determine differences in distributed practice spacings.

The superiority of distributed practice over massed practice has been well documented in psychological literature for about 100 years (Grote, 1995). It has proven to be successful across populations and skill deficits. However, the determination of differences in distributed practice spacing has yet to be resolveded.

Schuster et al. (1992) state that there are several evident advantages of the constant time delay procedures. First, the procedures are teacher friendly. They require little teacher preparation, are quick (i.e., result in short session lengths), and are easy to use (i.e., result in a high degree of procedural reliability). Second, the procedures are student friendly, resulting in low percentages of student errors and therefore a high density of student reinforcement. Also, Wolery, Holcombe, et al. (1992) found that the constant time delay procedure had been effective in teaching a variety of skills to students. The constant time delay procedures have been adopted to be used in this investigation, because research literature has shown that the procedures to be appropriate and accepted.

Students entering school vary in the amount of preparation they need and receive before learning to read. While some have only sporadic exposure to pre-reading activity, others engage in several thousand hours of such activities with their parents and in preschool programs (Adams, 1990). Students who fall behind early in the process of learning to read are often labeled and

identified as needing special assistance such as placement in remedial programs or special education. Moreover, there is evidence that children who fall behind in early reading will continue to lag behind their classmates despite efforts (e.g., Francis, Shaywitz, Steubing, Shaywitz, & Fletcher, 1996). The acquisition of sight words gives beginning readers early success and aid in getting children reading immediately (Jones, 1971;Wallen, 1972). Through the acquisition of sight words, children can quickly and automatically translate the letters or spelling patterns of written words into speech sounds so that they can identify words and gain rapid access to their meanings (Vandervelden & Siegel, 1997). Because it has proven to be beneficial in early reading, sight word acquisition will be incorporated in the study s intervention.

There are several practical arguments for the need to determine the if there is a difference in distributed practice schedules. Yeaton and Sechrest (1981) point out possible consequences of weak and strong treatment approaches. The authors say, weak therapy approaches, may leave the problem more resistant to change than before the unsuccessful attempt, perhaps in part because of discouragement. Rather than bringing the solution closer to fruition, an initially weak treatment may actually increase the amount of time energy, and money that must be spent. The authors add that, an obvious disadvantage of unduly strong treatments is the possibility of accruing unnecessary expense. Longer and more frequent sessions by trained staff translates into stronger, but more expensive treatments. If a difference in distributed practice spacing can be found, it would aid practitioners by helping them create more efficient and effect intervention treatment schedules for their clients.

It should be noted that, the experimenter does not assume this study can demonstrate all differences (if any) found in distributed practice schedules. The experimenter is also aware that

the scope of this study will not to apply to all populations, skills, and/ or interventions. This investigation hopes to be considered a contribution, since it is one of the first attempts (possibly the first) to extend the literature in this area.

The purpose of this study is to determine if there is a difference in distributed practice schedules, if the total time to practice remains constant. If a difference is found, the schedule which produces the superior amount of learning and the superior retention of learned materials will also be determined.

Method

Participants and Setting

Four first grade general education students (Vicki, Ted, Dana, & Ivan) attending an East Baton Rouge Parish public school will participated in this study. Students were referred by their teachers for poor performance in word recognition or early reading. After teacher nomination, parental consent for student participation was obtained. Participants completed skill assessments to identify their skill levels, which are described below. Students eligible for inclusion in this study were able to discriminate words from pictures or numbers, have letter sound and naming skills, phoneme segmentation fluency, and exhibit poor skills in the area of word recognition. Students excluded from the study were those who preform well in the pre-intervention screening in word discrimination, letter naming, phoneme segmentation, and word recognition. Also, students who were enrolled in resources classes, receiving additional services from the school, and/or taking medications for behavior problems or learning disabilities were excluded from study.

All sessions were conducted outside of the students classroom(s), but occurred in the students school. Setting included rooms with a table and chairs such as an office/therapy room, an empty gymnasium, and quiet hallways. The scheduling of session times were determined at the discretion of the teacher. For each participant, the number of sessions and length of each session depended on their condition.

Screening, Target Tasks, and Materials

Following teacher nominations, all participants completed a pre-intervention screening. The pre-intervention screening assessed students on four skills to determine reading readiness.

They included: word discrimination, letter naming and sounds, phoneme segmentation, and word recognition. Each child was removed from the classroom and was tested individually on two consecutive days. Each assessment screening began with the experimenter asking the student to complete a task or to verbally respond.

On day one, all four screening procedures were implemented: students were asked to complete a word discrimination, a letter sounds and naming, a phoneme segmentation, and a word recognition task. For the word discrimination screening nine cards were needed. Of these nine cards, three had numbers printed on them, three had a picture printed on them, and three had words printed on them. All nine cards were presented to the child at once. The student was asked to pick up the cards which had a word printed on them. Fifteen seconds were given to complete the task, and correct responses and attending behavior were praised. The number of correct responses were recorded. The number of correct responses were then divided by three and multiplied by 100 to obtain a percentage score. The percentage score was also recorded. The word discrimination task provided information about the extent to which a child can distinguish a word from non-words.

Next, the letter naming procedure was conducted. Fifty-two cards were needed. Each letter of the alphabet had its upper and lowercase form printed separately in black ink on white cards (3' x 5"). The experimenter presented the child with a letter card, and three seconds were given to respond (verbally stating the letter name). One or two seconds elapsed between stimulus presentations. Correct responses and attending behavior were praised. Cards receiving a correct response were separated from those receiving an incorrect/no response. The number of correct responses were recorded. The number of correct responses were then divided by fifty-two and

multiplied by 100 to obtain a percentage score. The percentage score was also recorded. The letter naming task allowed the experimenter to know if the students could recognize and verbally state each letter in the alphabet.

The letter sound procedure was then conducted. Fifty-two cards were needed. Each letter of the alphabet had its upper and lowercase form printed separately in black ink on white cards (3' x 5"). The experimenter presented the child with a letter card, and three seconds were given to respond (verbally stating the letter sound). One or two seconds elapsed between stimulus presentations. Correct responses and attending behavior were praised. Cards receiving a correct response were separated from those receiving an incorrect/no response. The number of correct responses were recorded. The number of correct responses were then divided by fifty-two and multiplied by 100 to obtain a percentage score. The percentage score was also recorded. The letter sound task allowed the experimenter to know if the students could recognize and verbally state each letter sound in the alphabet.

The phoneme segmentation fluency (PSF) procedure was conducted to determine reading readiness. A Dibels PSF form was used. A form contains approximately twenty-four words of three to four phonemes for each word. The experimenter orally presented each word to the student. The student was asked to produce verbally the individual phonemes of each word. Three seconds were given to respond between stimulus presentation. Praise was given at the end of the one minute assessment period. The number of correct phonemes produced in one minute were recorded. The number of correct phonemes was then divided by the number of phonemes attempted and multiplied by 100 to obtain a percentage score. The phoneme segmentation fluency task was a measure that assessed the student s skills to identify and produce the

individual sounds within a given word. The task allowed the experimenter to know if the student had phonological awareness.

Finally, the word recognition screening was implemented. The word recognition assessment required a screening list of 300 cards. These words were selected from the New Instant Word List (Fry, 1980) and were printed in lowercase letters in black ink on white cards (3' x 5"). The students were presented with a word card, and three seconds were given to respond. One or two seconds elapsed between stimulus presentation. Correct responses and attending behavior praised. Students were not given a verbal models. Cards receiving a correct response were separated from those receiving an incorrect/no response. Responses which were either incorrect or unread were recorded. A tangible reward was delivered at the end of the screening sessions for compliance. The word recognition task reduced the screening list of 300 words to a set of incorrectly and unread words for each student.

On day two, students were only asked to repeat the word recognition task. As in day one, each child was again removed from their classroom and were tested individually. The word cards used in the day two word recognition task were only those that were recorded as incorrect or unread for that student from the previous day. The student was presented with a word card, and three seconds were given to respond. One or two seconds elapsed between stimulus presentations. Correct responses and attending behavior were praised. Cards receiving a correct response will be separated from those receiving an incorrect/no response. Responses which were either incorrect or unread were recorded. A tangible reward was delivered at the end of the screening for compliance. The repeated word recognition task ensured that words from the initial assessment were truly unfamiliar to each student.

The scores for each participant from the two day screening sessions determined initial inclusion or exclusion from the experiment. That is, students reached the set criterion of 100% on the word discrimination, 90% on letter naming, 70% on letter sounds, and 70% on the phoneme segmentation fluency tasks. These criterion were arbitrarily determined. The word recognition task had no set criterion, because its purpose was to aid in determining which words could and could not be used in the intervention.

Due to a two-week separation in starting dates, the students were paired, Vicki with Ted and Dana with Ivan. The words used in the selection pile (words eligible for used in the intervention) for Vicki and Ted were chosen from the list of words that were recorded as incorrect or no response for both students during their word recognition screening sessions. This list of words entered the selection pile. From this pile, ninety words were randomly selected. Those ninety words were then be randomly divided into three equally numbered sets: word set 1(control) , word set 2, and word set 3. The word sets were used in the intervention as described below.

The words used in the selection pile for Dana and Ivan were chosen from the list of words that were recorded as incorrect or no response for both students during their word recognition screening sessions. This list of words entered the selection pile. From this pile, 120 words were randomly selected. Those 120 words were then be randomly divided into four equally numbered sets: word set 1(control) , word set 2, word set 3 and word set 4. The word sets were used in the intervention as described below.

A plastic box containing a variety of rewards (e.g., pencils, stickers, candy, charms, etc.) was used. These rewards were delivered contingent upon attending during screening and instructional sessions.

Response Definitions

Five student behaviors/responses occurred. They included unprompted correct, prompted correct, unprompted errors, prompted errors, and no response. The definitions of the responses were adapted from Wolery et. al (1990). The experimenter praised unprompted and prompted correct responses. Unprompted correct responses were recorded and counted toward criterion performance. Table 1 displays the operational definitions for the utilized responses.

Table 1

Student Responses

Response	**Operational Definition**
Unprompted Correct	Student states the word correctly before the experimenter s model
Prompted Correct	Student correctly imitates the experimenter s model within 4 seconds

Data Collection

An assessment trial for all word sets occurred (in one session) twice per week. All words were randomly compiled in a word deck, (i.e., 90 for Vicki & Ted, 120 for Dana & Ivan) and presented to the student. During the assessment trial the experimenter followed the same procedure as in the instructional trial using a 4-second delay interval (see below). The experimenter recorded only unprompted correct responses. The number of unprompted correct responses associated with each word set was determined, and counted toward that sets criterion performance.

Criterion for mastery of each word set was 100% unprompted correct responses for three consecutive assessments trials. The instructional trials continued until mastery was achieved or

until the intervention had run for a five-week period. Rewards were delivered contingent upon attending during the assessment session.

Inter-observer Agreement

A second experimenter was trained in the scoring procedures for the screening and assessment sessions. The experimenters independently and simultaneously observed and recorded each student s target response/behavior. Inter-observer agreement IOA was calculated for each session by dividing the number of agreements by the number of agreements plus disagreements for each session, and multiplying by 100% (Hartman, 1977).

IOA was collected on 50% of the total number of pre-intervention screening sessions. Mean IOA was 98.66% (range, 83.87% to 100%). IOA was collected on 33.33% of Vicki s assessment sessions. Mean IOA was 100% (range, 100% to 100%). IOA was collected on 33.33% of Ted s assessment sessions. Mean IOA was 100% (range, 100% to 100%). IOA was collected on 41.67% of Dana s assessment sessions. Mean IOA was 100% (range, 100% to 100%). IOA was collected on 41.67% of Ivan s assessment sessions. Mean IOA was 99.09% (range, 97.44 to 100%).

Procedure

Vicki and Ted were assigned three equally matched (number of words, word difficulty, number of syllables, etc.) word sets. Each word set contained 30 words. Those words recorded as incorrect or no response for all the students during the two word recognition screening sessions were used to create these sets. Word Set 1 served as a no treatment or baseline condition. These words were not given an instructional schedule, but students were assessed on them twice a week. Both participants were presented individually with Word Set 2 twice per week, for twenty minutes each session. They were also, presented with Word Set 3 four times

per week, for ten minutes each session. Both Word Sets 2 and 3 were presented for a total of forty minutes each week. Students were assessed on each word set twice per week. The instructional and assessment sessions continued until mastery was achieved or until the intervention had ran for a five-week period. It should be noted that Ted withdrew from the study after only three weeks of participation.

Dana and Ivan were assigned four equally matched (number of words, word difficulty, number of syllables, etc.) word sets. Each word set contained 30 words. Those words recorded as incorrect or no response for all the students during the two word recognition screening sessions were used to create these sets. Word Set 1 served as a no treatment or baseline condition. These words were not given an instructional schedule, but students were assessed on them twice a week. Both participants were presented individually with Word Set 2 twice per week, for twenty minutes each session, Word Set 3 four times per week, for ten minutes each session, and Word Set 4 one time per week, for 40 minutes each session. Word Sets 2, 3, and 4 were presented for a total of forty minutes each week. Students were assessed on each word set twice per week. The instructional and assessment sessions continued until mastery was achieved or until the intervention had ran for a five-week period. Table 2 presents a summary of the schedules and word set assignments.

Instructional Sessions. The constant time delay procedure modeled after the procedure used in the Wolery et. al (1990) study was followed to instruct Word Sets 2, 3, and 4, and to assess Word Sets 1, 2, 3, and 4. In the first trial of each instructional session for each word set, the experimenter presented the words using a 0-second interval between the task direction (What is this word?) and the controlling prompt (verbal model of the word). That is, after presenting the task direction the experimenter immediately state the correct word. In all subsequent

sessions, the experimenter present the task direction and waited 4 seconds before delivering the controlling prompt (4-second delay interval). A criterion of 100% correct prompted responses at the 0-second delay interval was required before a 4-second delay was implemented.

The procedure for the 4 second delay trails started with the experimenter holding up the first word card of the deck, and saying Look (Students Name), What is this word? This was done to ensure that the student saw the word card. The task direction, Look (Students Name), What is this word? was stated when presenting the first three word cards of the deck for the initial trial, and for each repeated trial. All subsequent word cards were presented without the task direction (i.e., the task direction was implied). If the student did not respond to the task direction/ card presentation within the 4-second delay interval, the experimenter delivered the controlling prompt (verbal model of the word) and waited 4 seconds for a response. During instruction, five potential responses occurred: unprompted correct, prompted correct, unprompted errors, prompted errors, and no response. Unprompted and prompted correct responses will result in the experimenter giving praise.

This process was repeated until session time was up. Criterion for mastery of each word set was 100% unprompted correct responses for three consecutive assessment sessions. The instructional sessions continued until mastery was achieved or until the intervention had ran for a five-week period. Rewards were delivered contingent upon attending during the instructional session.

Table 2

Word Set Assignments and Session Schedules

Condition	Word Set	Number and Length of Instructional Sessions
1 (control)	**1**	no sessions/ week
2	**2**	two-20 minute sessions/week
3	**3**	four-10 minute sessions/week
4	**4**	one-40 minute session/week

Table 2. Note that word sets 2, 3, and 4 for each participant had instruction for a total of 40 minutes each week.

Experimental Design and Conditions

Design. An alternating treatments design was employed to evaluate the effects of the treatment conditions. Graphic presentation of the effects of each treatment are included for means of comparison. The number of unprompted correct responses for each student per assessment were calculated and plotted. The visual inspection of the relationship among the data paths representing the different treatments indicated which conditions were the most effective and time efficient. In addition, unprompted correct responses were recorded for a no-treatment condition. This served as a baseline comparison for each student.

Baseline. A no-treatment/ no-instruction condition served as baseline, and was assessed twice per week. During baseline, students were assessed on an unpracticed word set, Word Set 1/ Condition 1. Data was collected on all unprompted correct responses. Data collection occurred twice per week. The baseline information served as a basis of comparing no treatment to varied schedules of treatment.

One Session Per Week. An instructional condition occurring once per week for forty minutes each session. During this condition, students were assessed on a practiced word set.

Data was collected on all unprompted correct responses. Data collection occurred twice per week.

Two Sessions Per Week. An instructional condition occurring twice per week for twenty minutes each session. During this condition, students were assessed on a practiced word set. Data was collected on all unprompted correct responses. Data collection occurred twice per week.

Four Sessions Per Week. An instructional condition occurring four times per week for ten minutes each session. During this condition, students were assessed on a practiced word set. Data was collected on all unprompted correct responses. Data collection occurred twice per week.

Treatment Integrity. At least 1/4 of all instructional sessions, for each participant, were observed by an independent observer who assessed to what degree the intervention was consistent with the description of the procedure. A task analysis/ integrity checklist of the instructional procedure was constructed (see Appendix B). The independent observer recorded all steps of the task analysis which occurred. Treatment integrity was calculated for a session by dividing the number of agreements by the total number of possible agreements for each session, and multiplying by 100%.

Treatment integrity was collected on 26.67% of Vicki s instructional sessions. Mean integrity was 97.37% (range, 89.47% to 100%). Treatment integrity was collected on 33.33% of Ted s instructional sessions. Mean integrity was 100% (range, 100% to 100%). Treatment integrity was collected on 33.33% of Dana s instructional sessions. Mean integrity was 100% (range, 100% to 100%). Treatment integrity was collected on 26.27% of Ivan s Instructional sessions. Mean integrity was 97.37% (range, 89.37 to 100%).

Follow-ups. Follow-up sessions were conducted for each student two weeks after the last day of instruction on each word set. During these sessions, an assessment of the word set occurred. These assessments followed the assessment procedure stated above. The control set and the word set of interest were included in each follow-up assessment word deck. It should be noted that Ted, the student who withdrew from the study after only three weeks of participation, agreed to return for the follow-up assessment two weeks after his withdrawal.

Results

Pre-Intervention Screening

During the initial screening phase, Vicki scored 100% in the area of word discrimination, 98.1% in the area of letter recognition, 71.2% in the area of letter sounds, 100% in the area of phonemic segmentation, and averaged 39.83% over the two day screening in the area of word recognition. Ted scored 100% in word discrimination, 100% in letter recognition, 86.5% in of letter sounds, 72.22% in the area of phonemic segmentation, and averaged 27.17% over the two day screening in word recognition. Dana scored 100% in word discrimination, 100% in the area of letter recognition, 80.77% in the area of letter sounds, 100% in the area of phonemic segmentation, and averaged 6.67% over the two day screening in word recognition. Lastly, Ivan scored 100% in word discrimination, 100% in letter recognition, 88.46% in letter sounds, 94.12% in phonemic segmentation, and averaged 4.17% over the two day screening in word recognition.

Treatment Conditions

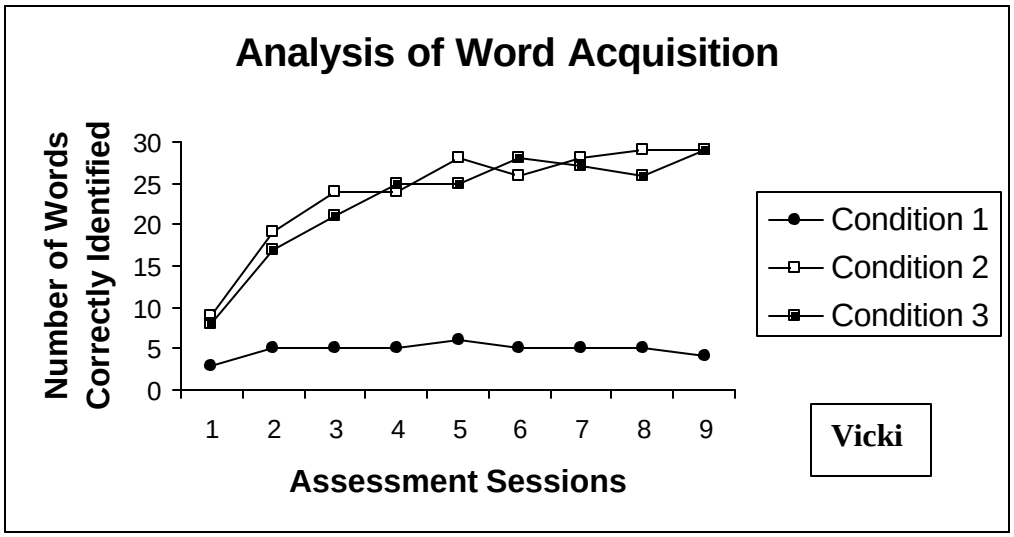
Results for Vicki and Ted are depicted in Figure 1. For Vicki, during Condition 1 (baseline: no instructional sessions/week), the number of words correctly identified remained stable across the intervention and maintained a low level (M= 4.778, range, 3 to 6). In both Conditions 2 (two- 20 minute instructional sessions/week) and 3 (four- 10 minute instructional sessions/week), the number of words correctly identified originate with a moderately steep upward trends and begin to stabilize midway through the intervention. Vicki's averaged 24 words correctly identified during Condition 2 (range, 9 to 29), and averaged 23 words correctly identified during Condition 3 (range, 8 to 29).

It appears for Vicki, that Conditions 2 and 3 do not significantly differ in the amount of words identified during the assessment procedures, and that both conditions increase at approximately the same rate. Condition 1 obviously produced a significantly lower amount of words identified during assessments than Conditions 2 and 3, and remains low throughout the intervention.

During Condition 1, for Ted, the number of words correctly identified remained stable across the intervention and maintained a low level (M= 2.833, range, 1 to 5). In both Conditions 2 and 3, the number of words correctly identified maintain a moderately steep upward trend throughout the intervention. Ted averaged 21.167 words correctly identified during Condition 2 (range, 11 to 29), and averaged 19.667 words correctly identified during Condition 3 (range, 5 to 28).

As with Vicki, it appears for Ted that Condition 2 and 3 do not significantly differ in the amount of words identified throughout the assessment procedures, and that both conditions increase at approximately the same rate. Condition 1 obviously produced a significantly lower amount of words identified during assessments than Conditions 2 and 3, and remains low throughout the intervention.

Follow-up data for Vicki and Ted are presented in Figure 2. For both students, follow-up sessions were conducted approximately two weeks after the last day of instruction for each condition. Data indicates high retention for the amount of words identified during the assessments, when compared to the mean number of words identified for each condition. During follow-up Vicki was able to correctly identify 6 words form Condition 1, 30 words from Condition 2, and 27 words from Condition 3.



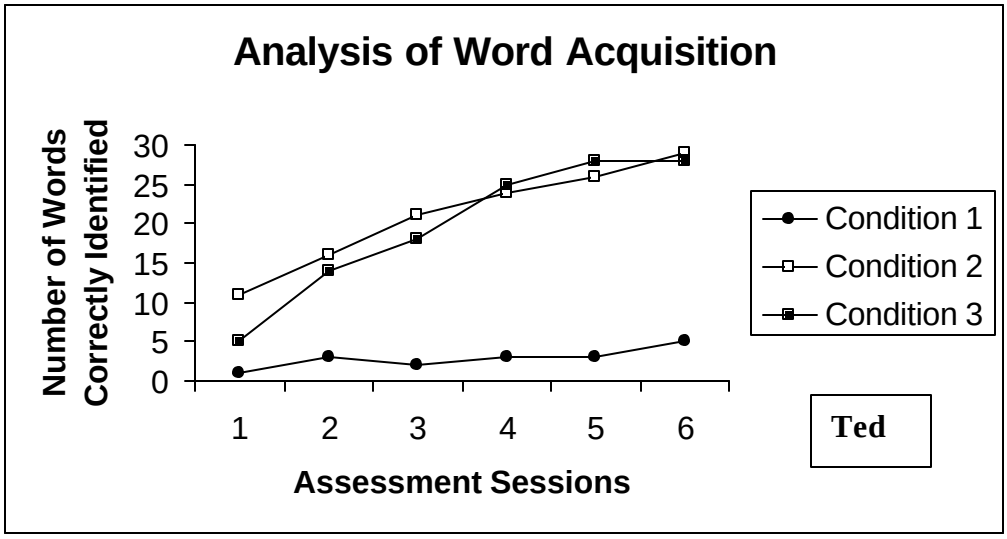
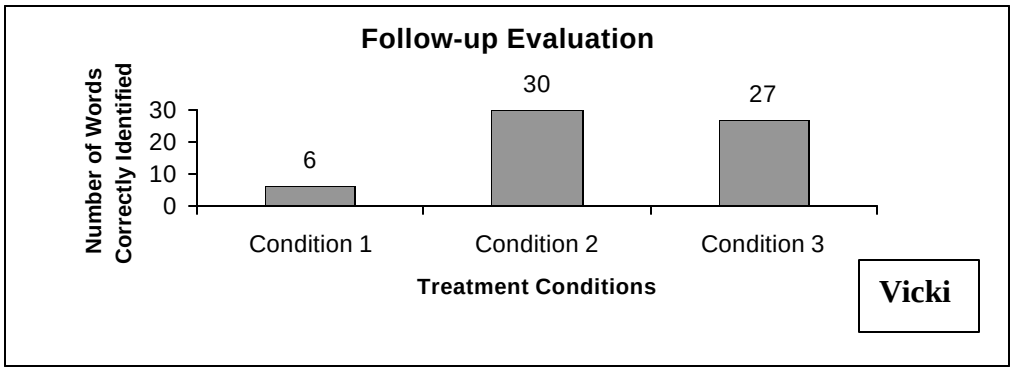


Figure 1. Vicki and Ted. Data represents word acquisition for Condition 1 (baseline: no instructional sessions/week), Condition 2 (two- 20 minute instructional sessions/week), and Condition 3 (four- 10 minute instructional sessions/week).



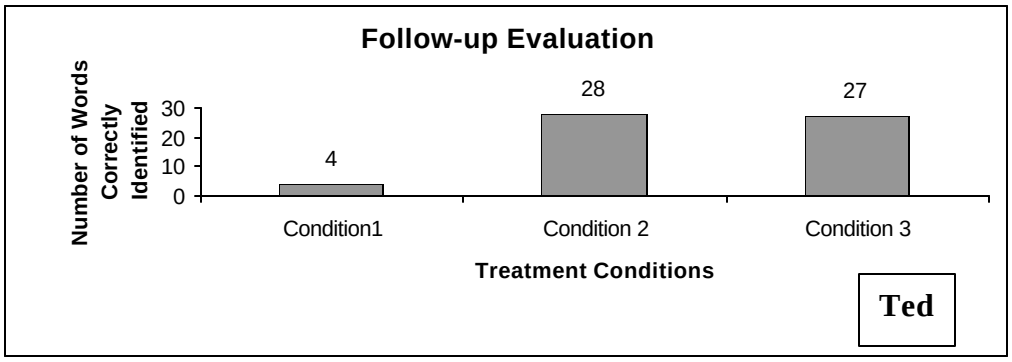


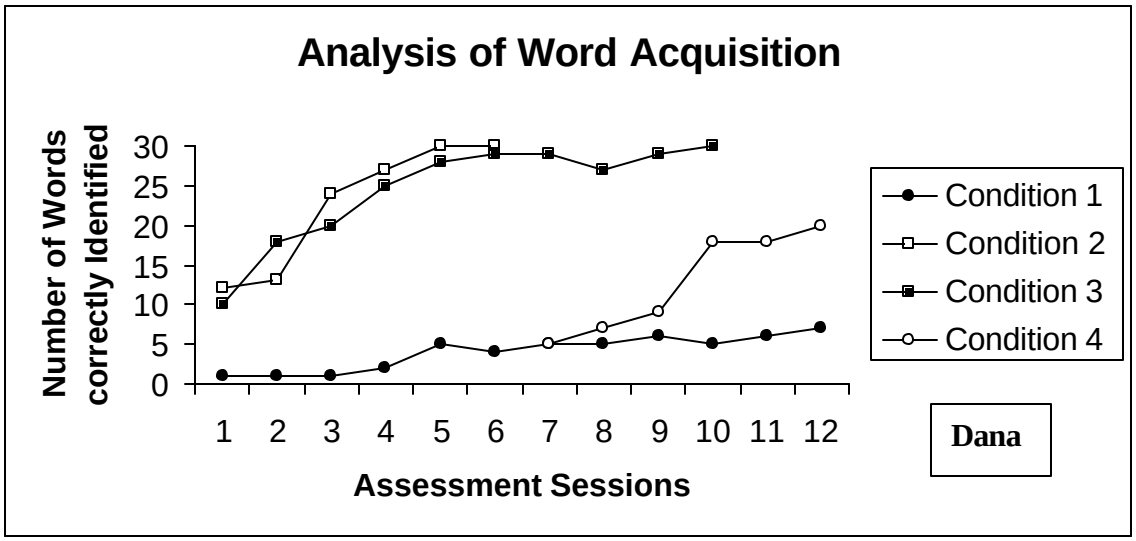
Figure 2 . Vicki and Ted. Data represents the number of words correctly identified at the follow-up evaluation occurring two weeks after the last day of instruction for each condition.

Ted correctly identified 4 words form Condition 1, 28 words from Condition 2, and 27 words from Condition 3. For Vicki, Conditions 2 appears to be superior to Condition 3 in the amount of words retained. Condition 2 produced more words retained for Vicki, and thus is was the superior condition for this participants. However, there appears to be no difference in the amount of words retained in Conditions 2 and 3 for Ted.

Results for Dana and Ivan are depicted in Figure 3. Dana maintained a stable low level during Condition 1 (M= 4, range, 1 to 7). In Condition 2, the number of word correctly identified display a moderately steep upward trend (M= 22.667, range, 12 to 30). Condition 3 originates with a moderately steep upward trends and then begins to stabilize midway through the intervention (M= 24.5, range, 10 to 30). Lastly, Condition 4 (one- 40 minute instructional session/ week), displays a continuing upward trend (M= 12.833, range, 5 to 20).

It appears for Dana, that Conditions 2 and 3 do not significantly differ in the amount of words amount of words identified during assessments throughout the intervention, and that both conditions increase at approximately the same rate. Condition 4 appears to be inferior in the amount of words identified during assessment in comparison to Conditions 2 and 3. In fact, it appears that the amount of words identified in Condition 4 occurs at approximately half the rate as the amount of words identified in Conditions 2 and 3. A graphical depiction of this can be seen in Figure 5. Condition 1 obviously produced a significantly lower amount of words identified during assessments than Conditions 2, 3, and 4, and remains low throughout the intervention.

Ivan maintained a very low and stable level during Condition 1 (M= 1.417, range, 0 to 3). In Condition 2, the number of word correctly identified displayed a upward trend (M= 15.167, range, 6 to 24). Condition 3 originates with a moderately steep upward trends and begins to



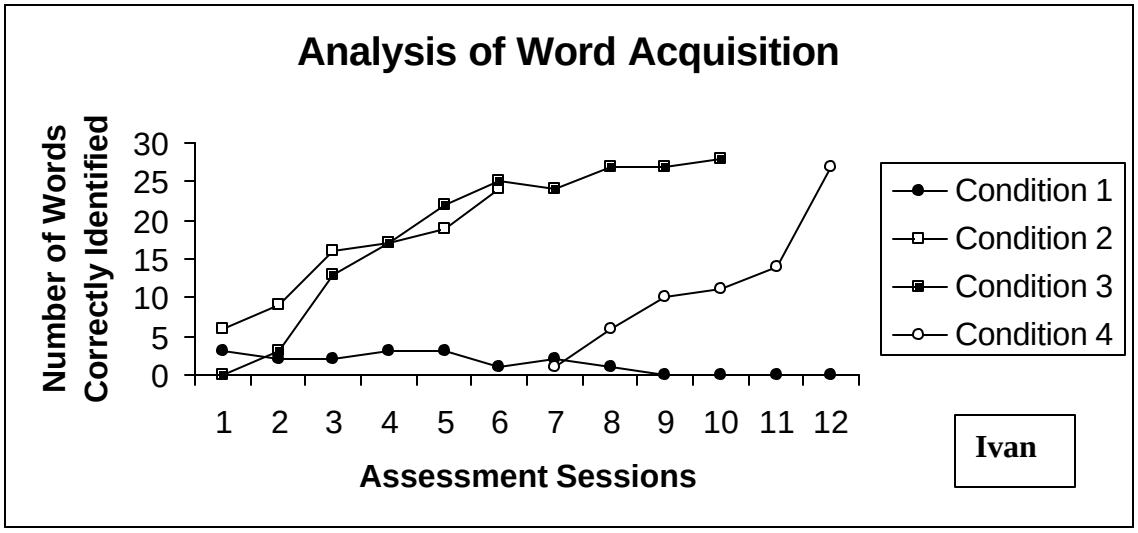
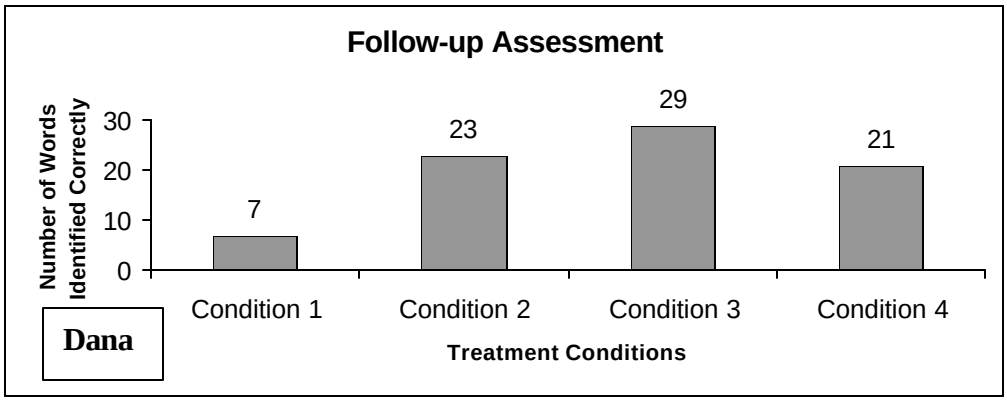


Figure 3. Dana and Ivan. Data represents word acquisition for Condition 1 (baseline: no instructional sessions/week), Condition 2 (two- 20 minute instructional sessions/week), Condition 3 (four- 10 minute instructional sessions/week), and Condition 4 (one- 40 minute instructional session/week).



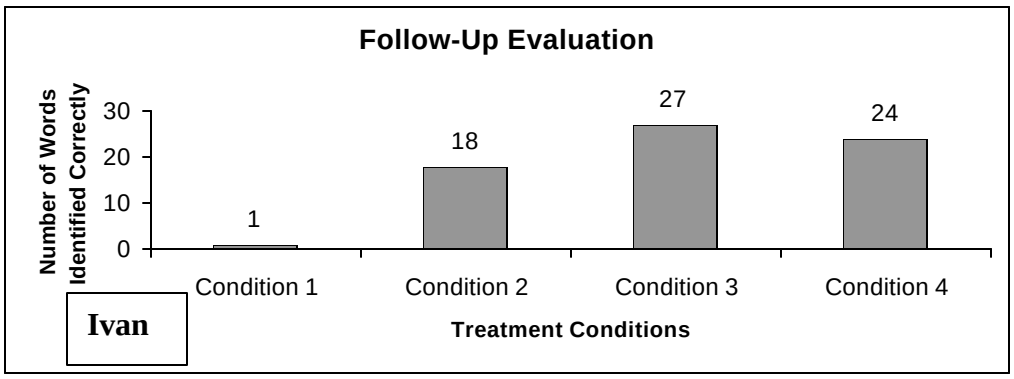
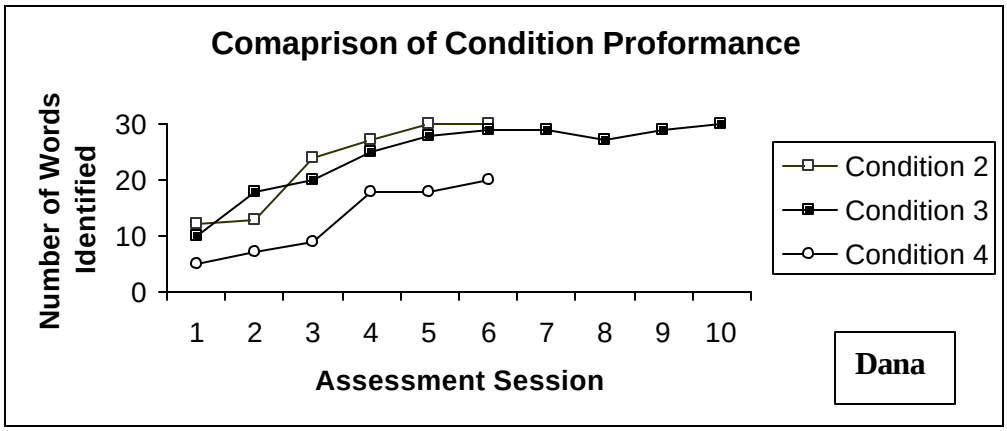


Figure 4 . Dana and Ivan. Data represents the number of words correctly identified at the follow-up evaluation occurring two weeks after the last day of instruction for each condition.



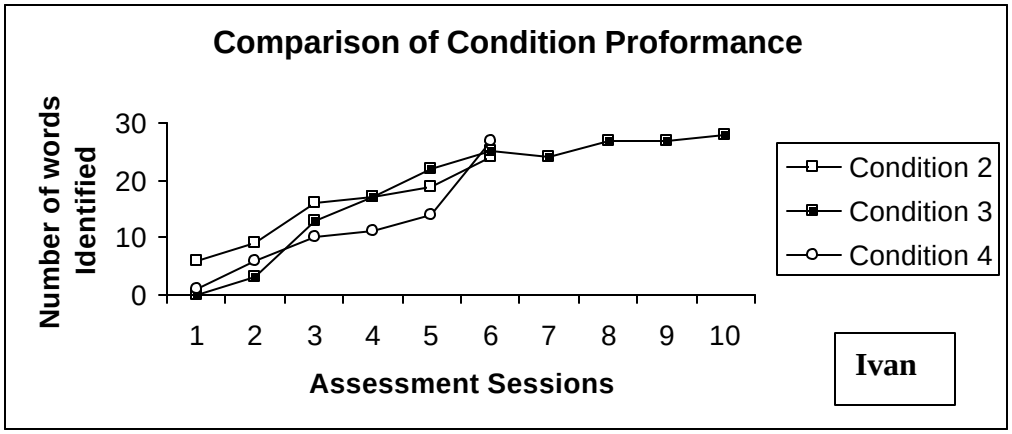


Figure 5. Dana and Ivan. Data represents the rate of amount of words identified during assessments for each intervention condition across sessions.

stabilize midway through the intervention (M= 18.6, range, 0 to 28). Lastly, Condition 4 presented a continuing upward trend (M= 11.5, range, 1 to 27).

For Ivan, Conditions 2 and 3 do not significantly differ in the amount of words identified during assessments throughout the intervention. Also, both Conditions 2 and 3 increase at approximately the same rate. Condition 4 appears to be inferior in the amount of words identified during assessments in comparison to Conditions 2 and 3. A graphical depiction of this can be seen in Figure 5. Condition 1 obviously produced a significantly lower amount of words identified during assessments than Conditions 2, 3, and 4, and remains low throughout the intervention

Follow-up data for Dana and Ivan are illustrated in Figure 4. During follow-up sessions, Dana correctly identified 7 words form Condition 1, 23 words from Condition 2, 29 words from Condition 3, and 21 words for Condition 4. This indicates high retention of words identified during assessments, when compared to the mean number of words identified for each condition. Follow-up sessions also indicate high retention of learned words for Ivan. He correctly identified 1 word form Condition 1, 18 words from Condition 2, 27 words from Condition 3, and 24 words from Condition 4. For Dana, Condition 2 appears to be inferior to Condition 3, and indifferent to Condition 4 in the amount of words retained. Also, Condition 4 appears to be inferior to Condition 3. For Ivan, Condition 2 appears to be inferior to Condition 3 and 4 in the amount of words retained. As with Dana, Condition 4 appears to be inferior to Condition 3 for Ivan. Overall, Condition 3 produced more words retained for both participants, and thus is was the superior condition.

Discussion

The objectives of this study were to extend prior research by (1) determining if there is a difference in distributed practice schedules, if the total time to practice remains constant, (2) determining which schedule produces the superior amount of learning, and (3) determining which schedules produces superior retention of learned materials across time. The results of this current investigation suggested that there are differences between distributed practice schedules for some students. For all participants, the twice per week condition and the four times per week condition were similarly effective in the amount of learning produced, and show to be more effective than practice occurring once per week (Condition 4) for those students exposed to that condition. Results from the follow-up assessments suggest that all conditions produced high retention for learned words, when compared to the mean number of words identified for each condition.

This investigation is one of the first attempts (possibly the first) to extend the literature in this area. Even though the spacing of learning sessions has already received considerable experimental investigation, the question of optimal spacing has not been solved. Most studies in the current literature have focused on establishing a difference in massed versus distributed practice. Experimental evidence indicates that, for the same amount of practice, learning is better when practice is distributed rather than massed (Fishman, Keller, & Atkinson, 1968). Moreover, in the overwhelming majority of cases it has been determined that distributed practice is superior. The present investigation is unique, because it examines distributed practice schedules solely, which makes it one of the few, if any, studies that have attempted this.

Also, the results of this investigation yields further proof of the effectiveness of the Constant Time Delay procedure. Wolery, Holcombe, et al. (1992) found that the time delay

procedure had been effective in teaching a variety of skills to students with a wide range of handicapping conditions. In the present investigation, the Constant Time Delay procedure was used in the acquisition of sight words for normally developing, regular education early elementary school children. Results showed that students learned an average of 68 new sight words over the course of the six-week intervention. Findings of the current investigation provides further support for the effectiveness of employing the response prompt procedure of Constant Time Delay within an intervention package to teach sight words to young students.

Overall, the findings of the current investigation are in agreement with past literature. As stated above, results concur with the effectiveness of the Constant Time Delay procedure. Also, follow-up findings are in agreement with studies conducted in the past. Past research shows that the retention of materials learned under distributed practice are better remembered. Findings supporting this can be found in articles written by Fisher, Keller, & Atkinson (1968), Grote (1995), and Krug, Davis, & Glover (1990). The high retention of learned words in the current investigation further demonstrates this phenomenon.

Limitations of this research can be attributed to the study s high degree of integrity, word selection, and participant attrition. Establishing the integrity of treatments would seem to be one of the most important aspects of the scientific investigation and practical application of behavior change or instructional procedures (Gresham, 1989). It is probable that the ineffectiveness of many instructional or behavioral interventions designed in a consultation context is due to the poor integrity of these interventions (i.e., deviations from a treatment or instructional protocol). In fact, the teacher consultation literature suggests that relatively little is known about the degree to which teachers implement interventions designed in consultation (Noell & Witt, 1999). Treatment integrity is necessary, but not sufficient, for the demonstration of functional relationships between experimenter-implemented independent variables (treatments) and

dependent variables. That is, some treatments may be functionally related to a dependent variable; however, this functional relationship may not be detected or demonstrated because of the poor integrity with which the treatment was applied (Gresham, 2000). The implementation integrity for this investigation ranges from 97.37% to 100%, and functional relationships were found. This can be perceived as disadvantageous, because possibilities of such high implementation integrity may be poor in applied settings (i.e. schools). Moreover, relationships found in this study may be altered or nonexistent if integrity is not highly sustained. It should be noted that although high integrity can be seen as a limitation in some circumstances, the researcher is aware that poor integrity is a disadvantageous in research.

The words selection process of this study can be perceived as a limitation, because it did not follow a systematic selection process proven by literature. Words used in the study came from the New Instant Word List (Fry, 1980). Each student was presented with 300 words from the Fry list, and words determined as unfamiliar to that student were entered into a selection pile. Words used in the intervention conditions were randomly chosen from the selection piles. Although, this study s word selection process does involve random selection, its strength could be improved with a more empirically sound technique that provides more similarity in words sets used for each condition.

Due to unforseen circumstances one participant (i.e. Ted) withdrew from the study before its completion. This can be considered a limitation, because it may have affected the interpretation of the data and some conclusions drawn from it.

The results of the investigation raise a number of important questions about distributed practice schedules that should be the focus of future studies. The results of the current investigation suggest that there are relationships associated with distributed practice schedules and the amount of material learned when integrity is high. Therefore, future research should focus on understanding the role of integrity in distributed practice schedules. For example,

researchers could manipulate integrity strength to determine which levels of integrity affect the effectiveness of the distributed practice schedules.

Also, the results of the current investigation suggest that differences in distributed practices schedules can be found using the Constant Time Dely Procedure when teaching sight words. Future studies should examine the differences in distributed practice schedules with a variety of interventions used to teach a variety of skills/tasks. For example, schedule differences may vary with the type of intervention used, and/or with the skills/tasks being taught. That is, do more complex skills/tasks (e.g. Mathematics or Multi-step Tasks) show larger differences in distributed practice schedules? This could be investigated even further by comparing complex and simple tasks to determine at what point and to what degree differences in distribute practice schedules appear.

In summary, the present investigation demonstrates that there are differences in distributed practice schedules, and that different schedules produce superior retention of learned material across time. These procedures have potential application for both the researcher and applied professional. That is, with knowledge about the effectiveness of distributed practice schedules the researcher could have schedule options for his/her investigations, and the practitioners could be more knowledgeable in designing intervention schedules for teachers and students. Once fully understood, the implementation of superior practice schedules have the potential to save time, money, and efforts. This will benefit the student, teacher, practitioner, and researcher. Yeaton and Sechrest (1981) state that a weak therapy approach may leave the problem more resistant to change, perhaps in part because of discouragement. Rather than bringing the solution closer to fruition, an initially weak treatment may actually increase the amount of time, energy, and money that may be spent. They also add that unsuccessful, weak treatments may also produce detrimental effects on the motivation level of the client. This investigation data which may aid in the selection and design of practice schedules, which in turn may produce more effective and efficient interventions.

References

Adams, M. J. (1990). *Beginning to read: thinking and learning about print*. Cambridge, MA: MIT Press.

Ault, M. J., Gast, D. L., & Wolery, M. (1988). Comparison of progressive and constant time delay procedures in teaching community-sign word reading. *American Journal of Mental retardation, 93,* 44-56.

Ault, M. J., Gast, D. L., Wolery, M., Doyle, P. M., & Eizenstat, V. (1988). Comparison of response prompting procedures in teaching numerical identification to autistic subjects. *Journal of Autism and Developmental Disorders, 18,* 627-636.

Ault, M. J., Wolery, M., Doyle, P. M., & Gast, D. L. (1989). Review of comparative studies in the instruction of students with moderate and severe handicaps. *Exceptional Child, 55,* 346-356.

Bennett, D. L., Gast, D. L., Wolery, M., & Schuster, J. (1986). Time delay and systems of least prompts: a comparison in teaching manual sign production. *Education and Training of the Mentally Retarded, 21,* 117-129.

Billingsley, F. F., & Romer, L. T. (1983). Response prompting and the transfer of stimulus control: methods, research, and a conceptual framework. *Journal of the Association for the Severely handicapped, 7,* 531-536.

Blake, K. (1976). Massed and distributed practice and retarded and normal pupils learning sight vocabulary. *Journal of Research and Development in Education, 9,* 12-13.

Bloom, K C., & Shuell, T. J. (1981). Effects of massed and distributed practice on the learning and retention of second-language vocabulary. *Journal of Educational Research, 74,* 245-248.

Bommarito, J. W. (1978). Enhancing word recognition skills among learning disabled children by means of self-instructional training. (ERIC Document Reproduction Service No. ED 215- 319)

Bower, G. H. (1972). Stimulus-sampling theory of encoding variability. In A. W. Melton & E. Martin (Eds.), *Coding process in human memory* (pp.85-123). Washington, DC: V. H. Winston & Sons.

Browder, D. M., & D Huyvetters, K. K. (1988). An evaluation of transfer of stimulus control and of comprehension in sight word reading for children with mental retardation and emotional disturbance. *School Psychology Review, 17,* 331-342.

Browder, D. M., Hines, C., McCarthy, L. J., & Fees, F. (1984). Teaching sight words instruction booklets and their use in daily living skills. *Education and Training of Mentally Retarded, 19,* 1191-200.

Browder, D. M., & Lalli, J. S. (1991). Review of research on sight word instruction. *Research in Developmental Disabilities, 12,* 203-228.

Browder, D. M., Morris, W. W., & Snell, M. E. (1981). Using time delay to teach manual signs to a severely retarded student. *Education and Training in the Mentally Retarded, 16,* 252-258.

Browder, D. M., & Shear, S. M. (1996). Interspersal of known items in a treatment package to teach sight words to students with behavior disorders. *Journal of Special Education, 29,* 400-413.

Browder, M. D. & Xin, Y. P. (1998). A meta-analysis and review of sight word research and its implications for teaching functional reading to individuals with moderate and severe disabilities. *The Journal of Special Education, 32,* 130-153.

Carroll, J. B., Davies, P., & Richman, B. (1971). *The american heritage word fluency book.* Boston, Mass.: Houghton Miffin.

Challis, B. H. (1993). Spacing effects on cued-memory tests depend on level of processing. *Journal of Experimental Psychology: Learning, Memory and Cognition, 19,* 389-396.

Collins, B. C., & Griffen, A. K., (1996). Teaching generalized reading of product warning labels to adolescents with mental disabilities through the use of key words. *Exceptionality, 5,* 163-181.

Cronin, K. A., & Cuvo, A. J. (1979). Teaching mending skills to mentally retarded adolescents. *Journal of Applied Behavior Analysis, 12,*401-406.

Cuvo, A. J., & Klatt, K.P. (1992). Effects of community-based, videotape, and flash card instruction of community-reference sight words on students with mental retardation. *Journal of Applied Behavior Analysis, 25*, 499-512.

Cybriwsky, C. A., Wolery, M., & Gast, D. L. (1990). Use of a constant time delay procedure in teaching preschoolers in a group format. *Journal of Early Intervention, 14,* 99-116.

Dempster, F. M. (1988). A case study in the failure to apply the results of psychological research. *American Psychologist, 43,* 627-634.

Doyle, P. M., Wolery, M., Ault, M. J., & Gast, D. L. (1988). System of least prompts: a review of procedural parameters. *Journal of the Association for Persons with Severe Handicaps, 13,* 28-40.

Doyle, P. M., Wolery, M., Gast, D. L., & Ault, M. H.(1990). Comparison of constant time delay and the system of least prompts in teaching preschoolers with developmental delays. *Research in Developmental Disabilities, 11,* 1-22.

Durkin, D. (1972). *Teaching young children read.* (pp. 248, 261-262). Boston: Allyn & Bacon, Inc.

Fishman, E. J., Keller, L., & Atkinson, R. C. (1968). Massed versus distributed practice in computerized spelling drills. *Journal of Educational Psychology, 59,* 290-296.

Francis, D. J., Shaywitz, S. E., Sturbing, K. K., Shaywitz, B. A., & Fletcher, J. M. (1996). Developmental lag versus deficit models of reading disability: a longitudinal, individual growth curve analysis. *Journal of Educational Psychology, 88,* 3-17.

Fry, E. (1972). *Reading instruction for classroom and clinic.* (p. 51). New York: McGraw-Hill, Inc.

Fry, E. (1980). The new instant word list. *The Reading Teacher,34*, 284-289.

Gast, D. L., Ault, M. H.,Wolery, M., Doyle, P. M.,& Belanger, S. (1988). Comparison of constant time delay and the system of least prompts in teaching sight word reading to students with moderate retardation. *Education and Training in Mental Retardation, 25,* 117-128.

Gast, D. L., & Wolery, M. (1988). Parallel treatments design: a nesting single subject design for comparing instructional procedures. *Education and Treatment of Children, 11,* 270-285.

Glenberg, A. M. (1976). Monotonic and nonmonotonic lag effects in paired-associate and recognition memory paradigms. *Journal of Verbal Learning and Verbal Behavior, 15,* 1-16.

Glenberg, A. M. (1979). Componets-levels theory of the effects of spacing of repetitions on recall and recognition. *Memory & Cognition, 7,* 95-112.

Godby, S., Gast, D. L., & Wolery, M. (1987). A comparison of time delay and system of least prompts in teaching object identification. *Research in Developmental Disabilities, 8,* 283-306.

Gresham, F. M. (1989). Assessment of treatment integrity in school consultation and prereferral intervention. *School Psychology Review*, 18, 37-50.

Gresham, F., MacMillan, D., Beebe-Frankenberger, M., Bocian, K., (2000). Treatment integrity in learning disabilities intervention research: do we really know how treatments are implemented.. *Learning Disabilities Research & Practice*, 15, Issue 4

Groff, P. (1974). The topsy-turvy world of sight words. *Reading Teacher, 27,* 572-578.

Grote, M. G. (1995). Distribute versus massed practice in high school physics. *School Science and Mathematics, 95,* 97-101.

Hafner, L. E., & Jolly, H. B. (1972). *Patterns for teaching reading in the elementary school.* (pp. 66, 91). New York: Macmillan, Inc.

Halle, J., Marshall, A., & Spradlin, J. (1979). Time delay: a technique to increase language use and facilitate generalization in retarded children. *Journal of Applied Behavior Analysis, 12,* 431-439.

Handen, B. L., & Zane, T. (1987). Delay prompting: a review of procedural variations and results. *Research in Developmental Disabilities, 8,* 307-330.

Harris, L. A., & Smith, C. B. (1972). *Reading instruction through diagnostic teaching.* (pp. 158-59, 165-66). New York: Rinehart and Winston, Inc.

Jacoby, L. L.(1978). On interpreting the effects of repetition: solving a problem versus remembering a solution. *Journal of Verbal Learning and Verbal Behavior, 17,* 644-667.

Jenkinson, J. C. (1989). Word recognition and the nature of reading difficulty in children with an intellectual disabilities: a review. *International Journal of Disability: Development and Education, 36,* 39-55.

Jones, D. M. (1971). *Teaching children to read.* (pp. 31, 63, 72). New York: Harper and Row, Inc.

Karlin, R. (1971). *Teaching elementary reading.* (pp. 143-45). New York: Harcourt Brace Jovanovich.

Keel, M. C., & Gast, D. (1992). Small-group instruction for students with learning disabilities: observational and incidental learning. *Exceptional Children, 58,* 357-368.

Kinny, P. G., Stevens, K. B., & Schuster, J. W. (1988). The effects of CAI and time delay: a system program for teaching spelling. *Journal of Special Education Technology, 9,* 61-72.

Krug, D., Davis, T. B., & Glover, J. A. (1990). Massed versus distributed repeated reading: a case of forgetting helping recall? *Journal of Educational Psychology, 82,* 366-371.

Lesgold, A. H., Rubinson, P., Feltovich, R., Glaser, D., Klopfer, & Wang, Y. (1988). Expertise in a complex skill: diagnosing x-ray pictures. In M. T. H. Chi, R. Glaser, & M. J. Farr (Eds.). *The nature of expertise* (pp. 311-342). Hillsdale, NJ: Erlbaum.

Madigan, S. A. (1969). Interserial repetition and coding processes in free recall. *Journal of Verbal Learnind and Verbal Behavior, 8,* 828-835.

McDonnell, J. (1987). The effects of time delay and increasing prompt hierarchy strategies on the acquisition of purchasing skills by students with severe handicaps. *The Journal of the Association for Persons with Severe Handicaps, 12,* 227-236.

McDonnell, J., & Ferguson, B. (1989). A comparison of time delay and decreasing prompt hierarchy strategies in teaching banking skills to students with moderate handicaps. *Journal of Applied Behavior Analysis, 22,* 85-91.

Metalis, S. A. (1985). Effects of massed versus distributed practice on acquisition of video game skill. *Perceptual and Motor Skills, 61,* 457-458.

Miller, U. C., & Test, U. W. (1989). A comparison of constant time delay and most to least prompting in teaching laundry skills to students with moderate retardation. *Education and Training in Mental Retardation, 24,* 363-370.

Mumford, M. D., Costanza, D. P., Baughman, W. A., Threlfall, K. V., & Fleishman, E. A. (1994). Influence of abilities on performance during practice: effects of massed and distributed practice. *Journal of Educational Psychology, 86,* 134-144.

National Institute of Child Health and Human Development (2000). Report of the national reading panel. teaching children to read: an evidence-based assessment of the scientific research literature on reading and its implications for reading instruction (NIH Publication No. 00-4769). Washington, DC: U.S. Government Printing Office.

Noell, G., & Witt, J. (1999). When does consultation lead to intervention implementation? *The Journal of Special Education*, 33, 29-35.

Quinn, C. E. (1980). Spelling tricks for sight words. *Academic Therapy, 15,* 443-447.

Reid, D. K., & Hresko, W. P. (1981). *A cognitive approach to learning disabilities.* New York: McGraw-Hill.

Rose, R. J., & Rowe, E. J. (1976). Effects of orienting task and spacing of repetitions of frequency judgements. *Journal of Experimental Psychology: Human Learning and Memory, 2,* 142-152.

Schloss, P. J., Alper, S., Young, H., Arnold-Reid, G., Aylward, M., & Dudenhoeffer, S. (1995). Acquisition of functional sigh words in community-based recreational settings. *Journal of Special Education, 29,* 84-96.

Schoen, S. F., & Ogden, S. (1995). Impact of time delay, observational learning, and attentional cuing upon word recognition during integrated small-group instruction. *Journal of Autism and Developmental Disorders, 25,* 503-519.

Schoen, S. F., & Sivil, E. O. (1989). A comparison of procedures in teaching self-help skills: increasing assistance time delay, and observational learning. *Journal of Austim and Developmental Disorders, 19,* 57-72.

Schooler, C. (1990). Psychosocial factors and effective cognitive functioning in adulthood. In S. E. Birren & K. W. Schaie (Eds.). *Handbook of the psychology of aging* (pp. 347-358). San Diego, CA: Academic Press.

Schuster, J. M., Gast, D. L., Wolery, M., & Guiltinan, S. (1988). The effectiveness of constant time delay procedure to teach chained responses to adolescents with mental retardation. *Journal of Applied Behavior Analysis, 21,* 169-178.

Schuster, J. W., Griffen, A., & Wolery, M. (1992). Comparison of simultaneous prompting and constant time delay procedures in teaching sight words to elementary students with moderate mental retardation. *Journal of Behavioral Education, 2,* 305-325.

Schuster, J. W., Morse, T. E., Ault, M. J., Crawford, M. R., & Wolery, M. (1998). Constant time delay with chained tasks: a review of the literature. *Education and Treatment of Children, 21,* 74-106.

Shaughnessy, J. J., Zimmerman, J., & Underwood, B. J. (1972). Further evidence on the MP-DP effect in free recall learning. *Journal of Verbal Learning and Verbal Behavior, 11,* 1-12.

Simms, R. B., & Falcon, S. D. (1987). Teaching sight words. *Teaching Exceptional Children, 20*, 30-33.

Skinner, B. F. (1957). *Verbal Behavior.* New York: Appleton-Century- Croft.

Smith, S. M., & Rothkopf, E. Z. (1984). Contextual enrichment and distribution of practice in the classroom. *Cognition and Instruction, 1,* 341-358.

Snell, M.E., & Gast, D. L. (1981). Applying time delay procedures to the instruction of the severely handicapped. *The Journal of the Association for the Severely Handicapped, 6,* 3-14.

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, K., & Schuster, J. W. (1987). Effects of a constant time delay procedure on the written spelling performance of a disabled student. *Learning Disability Quarterly, 10,* 916.

Toppino, T. C., & Schneider, M. A. (1999). The mix-up regarding mixed unmixed lists in the spacing-effect research. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 25,* 1071-1076.

Touchette, P. E. (1971). Transfer of stimulus control: measuring the moment of transfer. *Journal of Experimental Analysis of Behavior, 15,* 347-354.

Vandervelden, M., & Siegel, L. S. (1997). Phonological recording and phoneme awareness in early literacy: a developmental approach. *Reading Research Quarterly, 30,* 854-875.

Wallen, C. J. (1972). *Competency in teaching reading.* (pp. 21-22). Chicago: Science Research Associates.

Wilson, R. M., & Hall, M. (1972). *Reading and the elementary school child*. (p. 124). New York: Van Nostrand Reinhold.

Wolery, M., Ault, M. J., Gast, D. L., & Doyle, P. M. (1992). *Teaching students with moderate to severe disabilities Use of response prompting procedures.* White Plains, NY: Longman.

Wolery, M., Ault, M. J., Gast, D. L., Doyle, P. M., & Mills, B. M. (1990). Use of choral and individual attentional responses with constant time delay when teaching sight word reading. *Remedial and Special Education, 11,* 47-58.

Wolery, M., Cybriwsky, C. A., Gast, D. L., & Boyle-Gast, K. (1991). Use of constant time delay and attentional responses with adolescents. *Exceptional Child, 57,* 436-474.

Wolery, M., Holcombe, A., Cybriwsky, C., Doyle, P. M., Schuster, J. W., Ault, M. J., & Gast, D. L. (1992). Constant time delay with discrete responses. A review of effectiveness and demographic, procedural, and methodological parameters. *Research in Developmental Disabilities,* 239-266.

Yeaton, W. H., & Sechrest, L. (1981). Critical dimensions in the choice and maintenance of successful treatments: strength, integrity, and effectiveness. *Journal of Consulting and Clinical Psychology, 49,* 156-167.

Appendix A

Screening Record Form

Date_____ Time_____
Student_____ Experimenter_____

Day 1

Word Discrimination

_____ Number of words correctly chosen
_____ ***SCORE***: Number of words correctly chosen divided by 3 multiplied by 100

Letter Naming

_____ Number of letters correctly identified
_____ ***SCORE***: Number of letters correctly identified divided by 52 multiplied by 100

Letter Sounds

_____ Number of sounds correctly identified
_____ ***SCORE***: Number of sounds correctly identified divided by 52 multiplied by 100

Phoneme Segmentation

_____ Number of correct phonemes produced
_____ Total number of phonemes attempted
_____ ***SCORE***: Number of correct phonemes produced divided by the total number of phonemes attempted multiplied by 100

Word Recognition

Scoring: 1 - If student responds correctly

____ a	____ book	____ day	____ four	____ how
____ about	____ both	____ did	____ friend	____ I
____ after	____ box	____ do	____ for	____ if
____ again	____ bring	____ down	____ from	____ in
____ all	____ be	____ eat	____ get	____ is
____ an	____ been	____ each	____ give	____ it
____ and	____ before	____ ear	____ go	____ into
____ any	____ boy	____ end	____ good	____ just
____ are	____ but	____ early	____ girl	____ jump
____ as	____ by	____ eight	____ got	____ know
____ at	____ can	____ every	____ hand	____ kind
____ also	____ car	____ eyes	____ high	____ keep
____ am	____ carry	____ face	____ hat	____ letter
____ another	____ clean	____ fall	____ happy	____ longer
____ away	____ close	____ fast	____ hard	____ love
____ along	____ clothes	____ fat	____ head	____ last
____ always	____ coat	____ fine	____ hear	____ leave
____ anything	____ cold	____ fire	____ help	____ left
____ around	____ cut	____ fly	____ hold	____ let
____ ask	____ come	____ food	____ hope	____ live
____ ate	____ call	____ full	____ hot	____ look
____ bed	____ came	____ funny	____ home	____ like
____ brown	____ color	____ gave	____ house	____ little
____ buy	____ could	____ goes	____ had	____ long
____ back	____ didn t	____ green	____ has	____ made
____ ball	____ does	____ grow	____ have	____ may
____ because	____ dog	____ far	____ he	____ men
____ best	____ don t	____ find	____ her	____ more
____ better	____ door	____ first	____ here	____ morning
____ big	____ dress	____ five	____ him	____ most
____ black	____ dear	____ found	____ his	____ mother

_____ must
_____ make
_____ man
_____ many
_____ me
_____ much
_____ my
_____ might
_____ money
_____ myself
_____ now
_____ new
_____ no
_____ not
_____ name
_____ near
_____ never
_____ next
_____ night
_____ only
_____ open
_____ over
_____ own
_____ of
_____ old
_____ on
_____one
_____or
_____ other
_____ our
_____ out
_____ o clock
_____ off
_____ once
_____ order
_____ pair
_____ part

_____ put
_____ people
_____ play
_____ please
_____ present
_____ pretty
_____ ran
_____ read
_____ red
_____ right
_____ run
_____ ride
_____ round
_____ same
_____ sat
_____ second
_____ set
_____ seven
_____ show
_____ sing
_____ sister
_____ sit
_____ six
_____ sleep
_____ small
_____ start
_____stop
_____ saw
_____ say
_____school
_____ seem
_____ shall
_____ should
_____ soon
_____ stand
_____ such
_____ sure

_____ said
_____ see
_____ she
_____ so
_____ some
_____ tell
_____ than
_____ these
_____ thing
_____ take
_____ that
_____ the
_____ their
_____ them
_____ then
_____ there
_____ they
_____ this
_____ three
_____ to
_____ two
_____ think
_____ too
_____ tree
_____ ten
_____ thank
_____ third
_____ those
_____ though
_____ today
_____ took
_____ town
_____ try
_____ turn
_____ under
_____ until
_____ upon

_____ use
_____ up
_____ us
_____ very
_____ was
_____ we
_____ were
_____ what
_____ walk
_____ warm
_____ wash
_____ water
_____ woman
_____ write
_____ when
_____ which
_____ who
_____ will
_____ with
_____ work
_____ would
_____ want
_____ way
_____ where
_____ while
_____ white
_____ wish
_____ why
_____ year
_____ you
_____ your
_____ yellow
_____ yes
_____ yesterday

Day 2

Word Recognition

Scoring: 1 - If student responds correctly

____ a	____ been	____ every	____ head	____ look
____ about	____ before	____ eyes	____ hear	____ like
____ after	____ boy	____ face	____ help	____ little
____ again	____ but	____ fall	____ hold	____ long
____ all	____ by	____ fast	____ hope	____ made
____ an	____ can	____ fat	____ hot	____ may
____ and	____ car	____ fine	____ home	____ men
____ any	____ carry	____ fire	____ house	____ more
____ are	____ clean	____ fly	____ had	____ morning
____ as	____ close	____ food	____ has	____ most
____ at	____ clothes	____ full	____ have	____ mother
____ also	____ coat	____ funny	____ he	____ must
____ am	____ cold	____ gave	____ her	____ make
____ another	____ cut	____ goes	____ here	____ man
____ away	____ come	____ green	____ him	____ many
____ along	____ call	____ grow	____ his	____ me
____ always	____ came	____ far	____ how	____ much
____ anything	____ color	____ find	____ I	____ my
____ around	____ could	____ first	____ if	____ might
____ ask	____ didn t	____ five	____ in	____ money
____ ate	____ does	____ found	____ is	____ myself
____ bed	____ dog	____ four	____ it	____ now
____ brown	____ don t	____ friend	____ into	____ new
____ buy	____ door	____ for	____ just	____ no
____ back	____ dress	____ from	____ jump	____ not
____ ball	____ dear	____ get	____ know	____ name
____ because	____ day	____ give	____ kind	____ near
____ best	____ did	____ go	____ keep	____ never
____ better	____ do	____ good	____ letter	____ next
____ big	____ down	____ girl	____ longer	____ night
____ black	____ eat	____ got	____ love	____ only
____ book	____ each	____ hand	____ last	____ open
____ both	____ ear	____ high	____ leave	____ over
____ box	____ end	____ hat	____ left	____ own
____ bring	____ early	____ happy	____ let	____ of
____ be	____ eight	____ hard	____ live	____ old

_____ on
_____one
_____or
_____ other
_____ our
_____ out
_____ o clock
_____ off
_____ once
_____ order
_____ pair
_____ part
_____ put
_____ people
_____ play
_____ please
_____ present
_____ pretty
_____ ran
_____ read
_____ red
_____ right
_____ run
_____ ride
_____ round
_____ same
_____ sat
_____ second
_____ set
_____ seven
_____ show
_____ sing
_____ sister
_____ sit
_____ six
_____ sleep
_____ small
_____ start
_____stop
_____ saw
_____ say
_____school
_____ seem
_____ shall
_____ should
_____ soon
_____ stand
_____ such
_____ sure
_____ said
_____ see
_____ she
_____ so
_____ some
_____ tell
_____ than
_____ these
_____ thing
_____ take
_____ that
_____ the
_____ their
_____ them
_____ then
_____ there
_____ they
_____ this
_____ three
_____ to
_____ two
_____ think
_____ too
_____ tree
_____ ten
_____ thank
_____ third
_____ those
_____ though
_____ today
_____ took
_____ town
_____ try
_____ turn
_____ under
_____ until
_____ upon
_____ use
_____ up
_____ us
_____ very
_____ was
_____ we
_____ were
_____ what
_____ walk
_____ warm
_____ wash
_____ water
_____ woman
_____ write
_____ when
_____ which
_____ who
_____ will
_____ with
_____ work
_____ would
_____ want
_____ way
_____ where
_____ while
_____ white
_____ wish
_____ why
_____ year
_____ you
_____ your
_____ yellow
_____ yes
_____ yesterday

Appendix B

Task Analysis For Sight Word Intervention

Instructional Trials

1. Check to make sure you are using the appropriate word deck.
2. Shuffle the word deck.
3. Set timer (remember each word deck has a different time associated with it)
4. Model (occurs once at the start of each session)
   - The experimenter gets the student s attention before presenting the first word in the deck
   - The experimenter presents a word card to the student
   - The experimenter allows a 0-second interval between the presentation of the word card and the verbal model
   - The experimenter verbally models the word
   - The experimenter re-presents the card to the student
   - The experimenter allows the student to respond
   - The experimenter repeats these steps for each word card to be presented
   - The experimenter delivers praise throughout the session
   - When the criterion of 100% correct prompted responses is achieved the experimenter begins to allow a 4-second intervals between presentations

5. Begin instruction
   - Get the student s attention before presenting the first word in the deck.
     Look (student s name), What is this word?
   - Allows 4-seconds for the student to respond
     Praises correct responses
     Good Job, Correct, Nice Work, etc. . .
   - If the student does not respond or incorrectly responds, state the word.
     Ex: Car
   - Re-present the word card.
   - Allow another 4 seconds for the student to respond.
   - Praises correct responses
     Good Job, Correct, Nice Work, etc. . .
   - Repeat these steps for each word in the deck, until the session time is up.
6. Deliver a reward before returning the student to class.
7. Sign out

Progress Monitoring

1. Randomly shuffle all three word decks together.
2. Get the student s attention before presenting the first word in the deck.
   Look (student s name), What is this word?
3. Present a word card to the student.
4. Allows 4-seconds for the student to respond.
5. Record the student s response on the record form.
6. Praises correct responses. *Good Job, Correct, Nice Work, etc. . .*
7. Repeat these steps for each word in the deck.
8. Complete the Progress Monitoring form and return it to the folder.
9. Separate the combined word deck back into three decks and return them to the box.

Appendix C

Treatment Integrity Checklist

Date_____ **Observer**_____
Student_____ **Experimenter**_____
Time_____

Scoring: 1 - If behavior occurs
n/a - If behavior is not appropriate

Modeled Trials

_____ The experimenter gets the student s attention before presenting the first word in the deck
_____ The experimenter presents a word card to the student
_____ The experimenter allows a 0-second interval between the presentation of the word card and the verbal model
_____ The experimenter verbally models the word
_____ The experimenter re-presents the card to the student
_____ The experimenter allows the student to respond
_____ The experimenter repeats these steps for each word card to be presented
_____ The experimenter delivers praise throughout the session
_____ When the criterion of 100% correct prompted responses is achieved the experimenter begins to allow a 4-second intervals between presentations

Instructional Trials

_____ The experimenter gets the student s attention before presenting the first word in the deck
_____ The experimenter presents a word card to the student
_____ The experimenter allows a 4-second interval for the student to respond
_____ If the student does not respond or incorrectly responds, the experimenter verbally models the word
_____ After each verbal model, the experimenter re-presents the word card and allows 4 seconds for the student to respond
_____ The experimenter verbally praises unprompted and prompted correct responses
_____ The experimenter repeats these steps for each word in the deck
_____ Before the experimenter re-presents the deck, he/she gets the student s attention before presenting the first word of the deck
_____ The experimenter repeats this process until the session time is up

Reward

_____ A reward is delivered to the student contingent upon attending during the session

Appendix D

Progress Monitoring/ Reliability Form I

Date_____ **Experimenter**_____
Student_____ **Time**_____

Scoring: 1 - If student responds correctly

Word Set 1 (RED)	**Word Set 2 (YELLOW)**	**Control (BLUE)**
____ also	____ any	____ after
____ ask	____ been	____ another
____ because	____ best	____ back
____ both	____ better	____ before
____ but	____ call	____ bring
____ clean	____ cold	____ came
____ could	____ dress	____ coat
____ first	____ fire	____ dear
____ friend	____ from	____ eyes
____ give	____ hand	____ food
____ hard	____ has	____ four
____ here	____ just	____ her
____ how	____ know	____ high
____ kind	____ last	____ left
____ let	____ leave	____ live
____ long	____ many	____ made
____ make	____ money	____ night
____ name	____ never	____ old
____ only	____ other	____ open
____ please	____ pretty	____ people
____ read	____ small	____ saw
____ soon	____ sure	____ seem
____ such	____ tell	____ take
____ there	____ that	____ they
____ thing	____ us	____ upon
____ until	____ very	____ wash
____ walk	____ water	____ way
____ where	____ what	____ white
____ will	____ wish	____ work
____ would	____ with	____ year
_____ **Total Correct**	_____ **Total Correct**	_____ **Total Correct**

Appendix E

Progress Monitoring/ Reliability Form II

Date_____ **Experimenter**_____
Student_____ **Time**_____

Scoring: 1 - If student responds correctly

Word Set 1 (RED)	**Word Set 2 (YELLOW)**	**Control (BLUE)**	**Word Set 4 (GREEN)**
_____ after	_____ also	_____ above	_____ air
_____ before	_____ because	_____ ask	_____ answer
_____ better	_____ bring	_____ bad	_____ bank
_____ clean	_____ came	_____ both	_____ carry
_____ dress	_____ dog	_____ coat	_____ children
_____ egg	_____ eight	_____ early	_____ city
_____ fire	_____ fat	_____ eyes	_____ cut
_____ four	_____ first	_____ face	_____ family
_____ friend	_____ food	_____ from	_____ found
_____ give	_____ grow	_____ happy	_____ full
_____ hard	_____ has	_____ high	_____ hope
_____ just	_____ ice	_____ kind	_____ horse
_____ last	_____ know	_____ leave	_____ jump
_____ left	_____ long	_____ live	_____ letter
_____ let	_____ made	_____ money	_____ line
_____ milk	_____ morning	_____ myself	_____ lost
_____ must	_____ name	_____ night	_____ paper
_____ never	_____ only	_____ order	_____ poor
_____ old	_____ open	_____ own	_____ second
_____ other	_____ party	_____ please	_____ ship
_____ pair	_____ pretty	_____ ride	_____ shoes
_____ people	_____ round	_____ seem	_____ story
_____ read	_____ stand	_____ such	_____ table
_____ small	_____ that	_____ take	_____ town
_____ soon	_____ us	_____ tell	_____ train
_____ true	_____ very	_____ until	_____ week
_____ upon	_____ walk	_____ wash	_____ winter
_____ water	_____ where	_____ with	_____ write
_____ way	_____ work	_____ would	_____ yard
_____ wind	_____ yes	_____ year	_____ yesterday
_____ **Total Correct**	_____ **Total Correct**	_____ **Total Correct**	_____ **Total Correct**

Appendix F

Sample Weekly Schedule

Monday	Instruction on Word Set 2 & Word Set 3
Tuesday	Assessment on all word sets & Instruction on Word Set 3
Wednesday	Instruction on Word Set 2 & Word Set 3
Thursday	Assessment on all word sets & Instruction on Word Set 3
Friday	(open to makeup any missed sessions)

Appendix G

Consent Form

University Terrace Elementary School

Date: _____

Dear Parent/Guardian of _____,

I am writing to request your permission to work with your son or daughter in an individualized intervention designed to increase beginning reading success. The intervention will focus on increasing your child s sight word vocabulary. An assessment of your child s skills will be conducted. The assessment will include word discrimination, letter naming & sounds, phoneme segmentation, and word recognition. The goal of the assessment is to determine if your son or daughter would benefit from this particular academic program.

The intervention will be conducted by students from the Department of Psychology at Louisiana State University. If you choose to allow us to work with your child, both you and your child's teacher will receive a copy of your child's results. Your child's results may also be included in research reports on ways to increase reading success in schools. If your child's results are included in any research reports, his or her name will not be included in the report. You may choose to withdraw your child from the assessment and/or intervention at any time.

If you have any questions please contact us at your earliest convenience.

Sincerely,

Kashunda L. Williams
Graduate Researcher
Louisiana State University
(225) 578-4093

UT- Elementary School
(225) 387-2328

____ I give my permission for my child to receive intervention services.

____ No, I prefer that my child not receive intervention services.

Date: _____ Parent/ Guardian: _____

Student: _____ Signature: _____

Vita

Kashunda L. Williams is a candidate for the degree of Master of Arts in the school psychology program at Louisiana state University, and currently works under the supervision of Dr. George H. Noell. She earned her bachelor of science degree in psychology from Louisiana State University in 2001. Upon successful completion of her master s defense, she will pursue a doctorate degree at Louisiana State University, under the supervision of Dr. George H. Noell.