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# Efficacy of Communicative Reading Strategies as an Instructional Approach for Adult Low-Ability Readers.

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# EFFICACY OF COMMUNICATIVE READING STRATEGIES AS AN INSTRUCTIONAL APPROACH FOR ADULT LOW-ABILITY READERS

A Dissertation

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ABSTRACT

Twelve adult low-ability readers participated in a pretest-posttest control group study investigating the efficacy of Communicative Reading Strategies (CRS) as an instructional reading approach. Six adults received CRS instruction and constituted the experimental group. The remaining six adults received skill-based instruction and served as the control group. All participants demonstrated instructional level reading skills at or below a fifth grade level and completed 40 hours of instruction.

Changes in performance on measures of word recognition, comprehension, and reading rate from pretest to posttest were used to compare CRS and control groups. Results of Mann Whitney U analyses revealed that both methods of instruction were effective in improving word recognition and comprehension abilities for most subjects. For individual subjects and mean group gains, the word recognition and comprehension results favored the CRS group, although these differences did not reach a level of statistical significance.

Further analyses of the reading performance of CRS subjects revealed additional findings. Scaffolding provided by CRS interactions increased both the assisted word recognition level and assisted comprehension scores for most subjects at both pretest and posttest.

Furthermore, reading gains made under scaffolded conditions at pretest were highly predictive of actual unassisted reading gains demonstrated after 40 hours of instruction. Measures of reading accuracy, fluency, rate, comprehension, and story retelling ability obtained from CRS subjects after every 10 hours of instruction was not representative of actual gains demonstrated at posttest.

# INTRODUCTION

Everywhere you turn there is something to read - menus, product labels, want ads, work orders, pay stubs, lease agreements, bills, letters, street signs, notes from teachers, movie schedules, and television captions. Most adults take for granted their ability to read and respond to the written language of their environment. But for adults with low reading skills, print is a constant reminder of something they cannot do well. Conservative estimates indicate 20-30 million adults in the United States are unable to read at a level necessary to function effectively on the job or in their everyday lives (Chisman, 1989; Stedman & Kaestle, 1987). Efforts to improve the reading abilities of these low-literate adults typically include the use of skill-based reading approaches that provide direct instruction for weak or deficient reading skills.

The purpose of this study was to investigate the efficacy of an alternative instructional reading approach, termed Communicative Reading Strategies (CRS) on the word recognition and comprehension abilities of adult low-ability readers. This approach differs from the skill-based approaches used with adult poor readers. CRS, as an integrated approach, focuses on reading as a meaning-making process. Individual skills are not taught, rather facilitative strategies are used to assist the reader in

successfully constructing on ongoing interpretation of the written text.

## Theoretical Models of Reading

Reading is generally acknowledged to be a complex skill, involving a constellation of perceptual, cognitive, and linguistic processes (Adams, 1990; Goodman, 1985, 1986; Kamhi & Catts, 1991; Smith, 1988). Fluent, meaningful reading results when a reader is able to simultaneously coordinate and integrate these various processes. Yet, in theory and practice, reading often is divided into two distinct components, word recognition and comprehension.

### Linear Models of Reading

Linear models of reading represent learning to read as an accumulation of discrete skills. In bottom-up models, word recognition precedes comprehension. Reading begins with the perceptual recognition and identification of letters. Individual letters are combined according to orthographic patterns that are translated to corresponding sounds and syllables. Words then are recognized and associated with word meaning. Comprehension results after words are recognized and interpretted within the context of the sentence.

In bottom-up models of reading, the ability to recognize words quickly and effortlessly is viewed as a first and prequisite step to comprehension (Adams, 1990; Chall, 1967; Stanovich, 1991). Findings from numerous

studies of prereaders, and good and poor readers appear to support the primacy of word identification in the reading process. Reading achievement has been correlated with speed and accuracy of letter naming (Bond & Dystra, 1967; Chall, 1967), awareness of the sound segments comprising words (Liberman, Shankweiler, Fischer, & Carter, 1974; Morais, Bertelson, Cary, & Alegria, 1986; Share, Jorm, Maclean, & Matthews, 1984), and facility in segmenting words and syllables into their component parts (Liberman, Shankweiler, Fischer, & Carter, 1974; Juel, Griffith, & Gough, 1986). Facility with these aspects of the code results in the quick word recognition demonstrated by skilled readers (Rayner & Pollatsek, 1987). When word recognition occurs with sufficient speed and accuracy, adequate cognitive resources are available for comprehension to result (Adams, 1990; Kamhi & Catts, 1991).

Skill-based reading instruction adheres to the constructs of bottom-up processing. These programs are designed to address specific aspects of language necessary for proficient reading. Skills are taught in isolation so that automatic and effortless word recognition is established prior to teaching comprehension. Instruction begins with the most discrete elements, such as letter names and sound-symbol associations, and continues in a systematic, additive manner until fluent word recognition

is achieved. With this facet of reading in place, comprehension can be achieved.

Whereas bottom-up models of reading suggest that reading begins with the correct identification of words, top-down models emphasize the primacy of higher levels of processing. In these models, reading is driven by prior knowledge, event and discourse structures, meaning, and word order strategies. Lower level processing only occurs to confirm a higher level hypothesis. Instruction within this model focuses on reading for meaning, with little attention given to the visual or perceptual aspects of word recognition.

## Integrated Models of Reading

Contrary to the linear processing suggested by bottom-up and top-down models of reading, fluent reading requires multilevel processing. Both bottom-up and top-town effects occur simultaneously as all levels of language inform each other during the process of reading (Bell & Perfetti, 1994; Clay, 1991; Rumelhart, 1977; Sulzby, 1985). Consider the top-down effects operating in the following example "The student wrote the _____". Only a limited number of words, from the range of all possible English words, will predictably fit this context. Grammatically, the word must be able to function as a noun, thereby eliminating all words that cannot fit this category. Semantically, the target word must refer to something the student can write or someone who can receive

the message. The reader's background knowledge about the kinds of writing that students engage in makes some words such as poem, answer, dissertation, president, note, or graffti more likely. Word choice is limited further by information provided from the surrounding context, such as knowing the student was in the process of taking a test (Goodman, 1986).

At the same time, bottom-up effects relating to the length of the word and its orthographic pattern are occurring. Word length provides cues to the syllabic and morphological structure of the word. If the word is represented by five or six letters, the reader will be more likely to select the word "answer" than "dissertation." Orthographic features also contribute to word selection. The presence of a letter at the beginning of a word eliminates other possible word candidates that fit the semantic, syntactic, and syllabic criteria. The appearance of a "p" would increase the probability of poem or president.

However, beginning letters are not the only orthographic cues utilized. Minimal processing of additional orthographic cues, such as the last letter of the word, may be all that is needed to recognize the actual word (Vellutino & Scanlon, 1987). Not only do bottom-up effects aid word recognition, they also influence comprehension. For example, depending on whether the word is identified as poem or president, you

might infer that the student was completing either an English or history assignment.

Current theorists of language and reading (Kamhi & Catts, 1991; Perfetti, 1985; Rummelhart, 1977; Stanovich, 1985) have begun to consider the simultaneous contribution and interaction of cognitive and linguistic processes during reading. Interactive models of reading that integrate a continuum of reading knowledge and processes during the reading act have been proposed. One such model used to support instructional reading practices has been developed by Seidenberg and McClelland (1989). This model will be described in the following section.

A Connectionist Model of Reading

Seidenberg and McClelland (1989) developed a comprehensive, interactive model of reading based on connectionist principles. This model emerged from research on the connectionist or parallel distributed processing approach to learning and representation of knowledge (Rummelhart, 1977; Rumelhart & McClelland, 1986). Adams (1990) used the model to integrate an extensive body of reading-related research and to generate implications for instruction.

The focus of Seidenberg and McClelland's research (Seidenberg & McClelland, 1989; Seidenberg, 1992) has been on word recognition. Specifically, their goal has been to develop a theory that accounts for the acquisition, skilled performance, and breakdown of word recognition

during reading. Word recognition is critical to reading. Not only is learning to recognize and pronounce words one of the first tasks facing a beginning reader, it also is considered to be the component of reading on which all comprehension processes depend (Adams, 1990; Chall, 1983; Seidenberg, 1992; Stanovich, 1986). Failure to acquire age-appropriate reading skills is characterized by deficits in word recognition skills (Perfetti, 1985). Consequently, Seidenberg and McClelland (1989) developed a model that uses a small number of computational principles to explain many important aspects of reading. These principles include the use of distributed representations of lexical knowledge, the encoding of knowledge by weights on connections between units (i.e., neuron-like processors), and the use of a connectionist learning algorithm to set the weights (Rumelhart & McClelland, 1986; Seidenberg & McClelland, 1989).

The theoretical framework proposed by Seidenberg and McClelland (1989) is distinct from the actual computational model they implemented. The implemented model is a simplification of a larger lexical processing model. As it presently functions, the model is limited to processing only monosyllabic words and lacks a semantic component that specifies how meanings are attached to words. Despite these limitations, the current model is still "...broader in scope than any previous theory of word recognition..." (Seidenberg, 1992, p. 244). Adams

(1990) considers how the structure of the theoretical model can account for many aspects of the reading process. It is the theoretical potential of connectionist models that will be discussed in this study.

In the theoretical model, skillful word recognition is assumed to utilize more than orthographic information, or knowledge of the patterns of letters within words. Recognizing words also depends on their meanings and contexts of occurrence (e.g., the semantic codes), and their pronunciations (e.g., the phonological codes). Furthermore, codes related to the syntactic and thematic functions of words would need to be computed if contextual reading and comprehension were considered. The model, as illustrated by Seidenberg and McClelland (1989) is shown in Figure 1.

Processing within the model is interactive as represented by the bidirectional arrows connecting the hidden units and the four processors. This means that the process of building a representation of knowledge at each of the levels influences, and is influenced by, the construction of representations at each of the other levels. Orthographic, phonological, and semantic information directly interacts to influence word recognition, while contextual factors related to syntactic, semantic, and pragmatic constraints indirectly influence word processing (McClelland, 1987; Rumelhart, 1977; Seidenberg & McClelland, 1989). For example, the

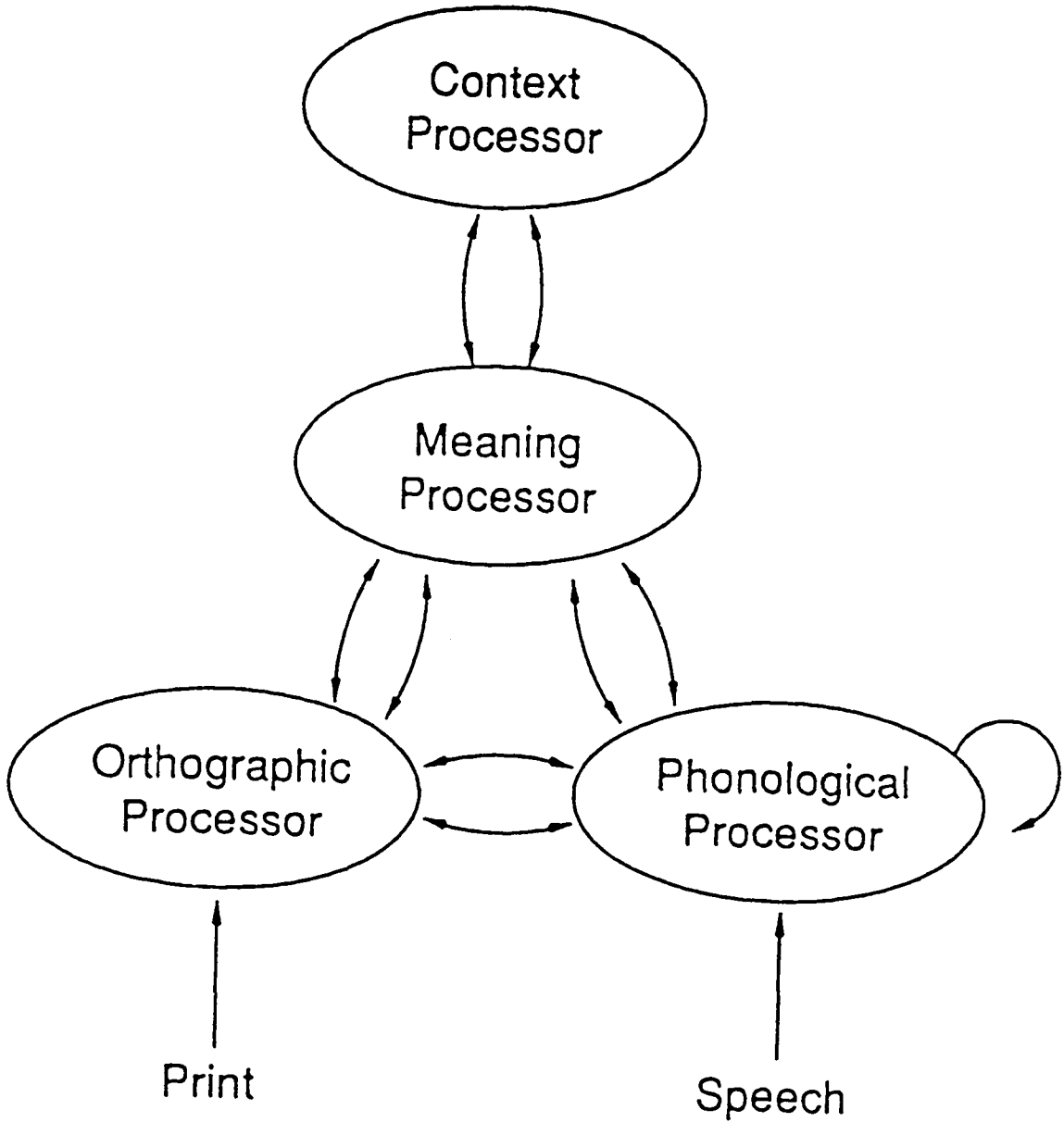


Figure 1-1. A connectionist model of reading.

context and orthographic units that have no direct connections to each other may still experience indirect influences through representations at the semantic level (see Figure 1).

The working of the model is predicated on assumptions about the way in which activations influence each other (i.e., processing assumptions), how connection strength adjustment occurs as a result of experience (i.e., learning assumptions), and the manner in which orthographic, semantic, and phonological characteristics of words are represented (i.e., representational assumptions). In reading, processing begins with the presentation of letter strings that are encoded into a pattern of activation over the orthographic units. This pattern simultaneously activates layers of hidden units that mediate between the orthographic, phonological, and semantic representational units. Upon activation, the hidden units spread activation to the phonological and semantic units. They also generate new activation for the orthographic units through a feedback mechanism. Thus, with each subsequent encounter with print, the system is revised and refined.

The refinement that occurs is a reflection of the changes in connection strength, or learning. The system must learn the correspondences between spelling, meaning, and sound. It must also learn what letter combinations constitute allowable and predictable orthographic patterns

of the language. Learning, then, occurs through repeated exposure to letter strings and corresponding strings of phonemes. When a letter string is presented, the hidden units produce a pattern of activation. This activation provides two types of output. First, the activation pattern provides feedback to the orthographic units so that the pattern present in the hidden units can be compared with (and should match) what is seen in print. At the same time, through a feedforward process, the hidden units activate patterns on the phonological units that are compared to the actual phonological pattern. The actual sound pattern may have been received through sources such as a teacher pronouncing a word for a student. Any discrepancies between the pattern produced by the activation and the target pattern result in a reweighting of the system. Adjustments continue until the patterns in the hidden units are consistent with the orthographic and phonological input patterns. Therefore, it is the learning occurring in the hidden units that links phonological patterns to orthographic patterns establishing sound-symbol associations.

Within the model, the orthographic and phonological characteristics of words exist as distributed representations. That is, specific letters, phonemes, or individual words do not correspond to any single unit. Rather, each letter or phoneme is represented by activation distributed across a complex pattern of units.

This type of representation adds flexibility to the system, enabling it to decide the identity of a letter or phoneme based on the best fit between the input and the representation. Because of this parallel distribution of representations, accommodations to different sizes, fonts, and distortions of print can occur.

This distributed principle of representation solves other problems incurred during reading such as distinguishing words on the basis of letter order. Using a scheme for specifying local context, rather than spatial position, makes this possible. Local context is comprised of the letters or spaces (marked as an __) immediately preceding and following each letter. For example, each input of the word lake activates all of the potential contexts for that word including _LA, LAK, AKE, and KE_. This feature enables the system to differentiate between words like tap and pat. Generalization also is possible because of the model's sensitivity to local context. What the system learns to do with a letter in one local context will transfer to the same letters in similar local contexts. Associations to the letter L in lake will transfer to the Ls in LATE and LAME, and to a lesser extent, to the Ls in LIKE and PLAY. Through this principle of distributed representation, the more words already represented in the system, the easier it is to recognize and pronounce new and unknown word including pseudowords that conform to predicted patterns.

The recognition of words begins when the orthographic component of the model receives input from print. Although individual letters are processed during reading, these letters are not recognized independently. Individual letter recognition does not occur because of the structure of the representations. (Recall that representations include the associations between letters in the hidden units formed, in part, through the model's sensitivity to local context.) Instead, words that are composed of frequently seen letter patterns are perceived more or less holistically. Research demonstrates that skilled readers can recognize more than five words per second (Rayner & Pollatsek, 1987) and read whole words as quickly and accurately as single letters (Cattel, 1886 as cited in Adams, 1990). Only 50 milliseconds are needed to gain all of the information available in a single fixation.

During reading, the eye does not move in a smooth, left-to-right motion across letters and words, but rather jumps from one position to another. A fixation occurs whenever the eye pauses (about one-quarter of a second) in its movement. During a fixation, letters and words are perceived. The range of a single fixation varies, depending on the familiarity of the information (Cattell, 1886 as cited in Adams, 1990). For example, if a random or unknown sequence of letters is presented, only four or five letters can be perceived during the fixation. But if

words are presented for the same amount of time, two or three unrelated words, totaling about 12 letters, can be recognized. If presented with words organized into a meaningful phrase or sentence, up to four or five words (about 25 letters) can be perceived. Adding meaning to the sequences of letters, at a level of organization higher than that of individual letters, reduces the amount of time required to make perceptual decisions. The more predictable the letters and letter sequences, the faster letters and words can be recognized.

The architecture of the computational model enhances the predictability of letters and letter sequences. When a reader fixates on a word, all of the letters and spaces within the range of that fixation are in full foveal view. Therefore, all of the letter units receive direct stimulation at the same time with each letter simultaneously passing excitation to the other letters, thereby establishing interletter associations (Seidenberg & McClelland, 1989). Because of the interactive nature of the model, the activity occurring in the orthographic component sends excitation to the hidden units and semantic codes. These areas, in turn, pass their activation of orthographic patterns and words that potentially fit the context back to the letters. The interletter associations plus the feedback from the semantic codes creates a situation where the whole word is more perceptible than the sum of its parts.

In the computational model, words, orthographic patterns, and letters are acquired through learning. Learning occurs in the many layers of representational and hidden units interacting across components. The more experience the system has with a letter, pattern, or word, the stronger those connections within and between the components. Therefore, when limited learning has occurred, such as for beginning or poor readers, more processing time is required to activate the appropriate pattern because the connections between the units are weak. This slower processing time is evidenced in the fixations of beginning readers. Beginning readers fixate twice per word, resulting in an average of 200 fixations per 100 words. Skilled readers fixate less than once per word, averaging 90 fixations per 100 words (Just & Carpenter, 1987).

Words that do not receive individual fixations tend to be very short, although not all short words are skipped. Just and Carpenter (1987) reported that skilled readers most often skipped short function words (e.g., of, in, to, or the), rather than short content words. This finding suggests that levels of organization higher than the orthographic component, including semantic and syntactic patterns, facilitate the perception of letters and words during reading (Smith, 1988). Activation from higher levels of the model provides input to the orthographic units in the same manner that viewing letters

does. In other words, several sources can provide input to the units representing letters. The hidden units do not distinguish where the input is coming from, rather they respond in an additive manner to any input received.

Further evidence that higher order processes influence orthographic level processing is found in the frequent occurrence of regressions. Regressions are eye movements that move from right-to-left or from one line to an earlier line. Readers produce regressions when information obtained from one word alters the interpretation of a previously processed word, as observed by self-correction of reading errors. They also may occur to verify a word, or to reactivate contextual information. If reading orally, the regression may be demonstrated through repetition of a word or phrase. Skilled readers produce regressions frequently, approximately once for every six fixations, indicating they are a productive strategy. In beginning readers, or when skilled readers attempt very difficult text, regressions occur once for every four fixations (Frederiksen, 1978).

The finding that higher levels of organization function to enhance letter and word recognition during reading holds important implications for instructional methods. If activating higher levels of information (e.g., meaning or context) sends excitations to orthographic units activating letter patterns that in turn enhance word recognition, then beginning or remedial

instruction does not need to start with teaching letters and sounds.

Adams (1990), however, predicts that using context to assist with word recognition may ultimately limit growth in word recognition. According to this view, reading words using a variety of higher level context cues may result in immediate word recognition but this recognition will contribute minimally to orthographic facility because individual letters are not focused on long enough to process. However, this prediction ignores the reciprocal nature of the computational model. Connection weights to the individual letter units would be strengthened when a word is recognized because of the interconnections between representational and hidden units. The result of successful reading would be increased recognition of words in isolation and awareness of orthographic patterns. In fact, reading more has been shown to be the most valuable means of improving reading (Anderson, Hiebert, Scott, & Wilkinson, 1985; Chall, 1983; Morrow, 1987).

Summary. The most popular models of reading are linear in nature, with learning to read resulting from the acquisition of discrete skills. More recently, interactive models have considered the simultaneous effects of different levels of information on learning to read. Connectionism has provided one theory for simultaneously integrating a continuum of reading processes. Within the connectionist network, proficient

reading is the product of the coordination and integration of information within and across multiple processing levels.

## Social Mediation

Adults with low literacy skills have demonstrated difficulty independently coordinating various aspects of language in the process of reading (Norman & Malicky, 1987). Without adequate integration, the processors will be unable to efficiently and effectively exchange information, thereby limiting the reader's ability to derive meaning from print. Vygotsky (1962) proposed that through social mediation, learners can accomplish tasks that, independently, they are unable to complete. He described this assisted level of performance as the learner's potential level of development. Through social mediation, learning beyond the current independent level of competence is possible.

Social mediation is thought to be the most effective when it occurs within the learner's Zone of Proximal Development (ZPD) (Vygotsky, 1978). This range of learning is bounded at the lower limit by the learner's independent level of functioning. In reading, this would be the level at which text is read and understood with little difficulty and without assistance or instruction. The upper limit of the ZPD represents the level at which the task is so difficult that the learner is unable to succeed even when provided assistance. At the upper limit

of the ZPD, reading would be difficult as evidenced by a slow rate of reading, and poor accuracy, fluency, and comprehension.

In reading, the assistance provided by a more competent peer allows adult low-ability readers to be immersed in constructing meaning from text at a more complex and difficult level than their current level of competence could support. Vygotsky (1978) proposed that frequent opportunities to engage in a behavior near the upper level of the ZPD maximizes learning. This exposure to and participation in complex reading lays the foundation for future reading behaviors required for more difficult text.

If the construct of a ZPD is valid and learning is maximized when instruction occurs at the upper level of the ZPD, then appropriate reading instruction would need to provide a means for engaging learners in reading text that is above their current independent level of competence.

## Communicative Reading Strategies

Communicative Reading Strategies (CRS) (Norris, 1985, 1988) was developed as an instructional technique that treats reading as an integrated language process, rather than a series of skills to be mastered. The instructional strategies facilitate the integration of processes involved in constructing meaning from written language. Through a variety of strategies (see Appendix A), a

facilitator provides the mediation between the reader and the text so that the reader can successfully reconstruct the message. The facilitator assumes responsibility for part of the reading by organizing the language of the text. Strategies used to support the reader may include providing preparatory sets that activate background knowledge, parsing complex language structures into smaller units, or providing feedback to clarify or expand information. This mediated or scaffolded approach enables less proficient readers to engage in reading connected discourse at a level beyond their current independent level of competence.

## Summary

Many adult poor readers are unable to independently coordinate and integrate the multiple levels of language required for fluent, meaningful reading. However, reading performance may be improved when assistance is provided by a more competent peer (Vygotsky, 1962). Therefore, reading instruction that facilitates the integration of lower and higher level language skills is needed. CRS is designed to facilitate the integration of multiple levels of language skills as readers are engaged in reading meaningful connected text. This study will investigate the effectiveness of CRS scaffolded interactions on the reading performance of adult low-ability readers.

## LITERATURE REVIEW

Reading is a highly researched topic. The literature is voluminous with data on reading development, reading disorders, instructional approaches to remediate poor reading, the relationship between language and reading, and a host of other reading-related areas (Adams, 1990; Barr, Kamil, Mosenthal, & Pearson, 1990). However, most of the available data was derived from research studies conducted with children. The purpose of this study was to investigate the efficacy of an integrated reading approach with adult low-ability readers. Therefore, this literature review will focus primarily on what currently is known about adult poor readers. Data regarding younger readers and general reading constructs will be drawn upon as needed.

The chapter will begin with a brief discussion of the evolving definition of literacy, leading to identification of those individuals considered to be functionally illiterate. Next, literature that describes the current state of knowledge on the reading development of adults will be presented. Instructional reading programs most commonly implemented with adult low-ability readers will be outlined, including specific information on the relevance of each approach to low-literate adults. The chapter will conclude with a presentation of the available data on the efficacy of adult literacy programs in

general, and various instructional reading approaches in particular.

## What is Literacy and Who is Literate?

Adult illiteracy in the United States has been described as a disease of epidemic proportions, an enemy to be conquered (Ilsley & Stahl, 1993), and its eradication by the year 2000 targeted in the National Education Goals; yet a precise definition of what constitutes literacy remains equivocal. In its most absolute terms, literacy is the ability to read and write. This standard of literacy was employed by the U.S. Census Bureau until the 1940s when people were considered literate if they either could read and write a simple sentence, or stated that they could read and write (Newman & Beverstock, 1990). However, as it became apparent that being able to perform simple reading or writing tasks did not guarantee the effective application of those skills, literacy began to be viewed in terms of functionality.

Although the definitions and criteria for functional literacy vary (Fingeret, 1984; Heathington, 1987), in general terms, literacy is "using printed and written information to function in society, to achieve one's goals, and to develop one's knowledge and potential." (Kirsch, Jungeblut, Jenkins, & Kolstad, 1993, p. 2). Regardless of its definition, illiteracy is a significant problem. Depending on the criteria used, between 20

million (Chisman, 1989) and 60 million (Kozol, 1985) adults are functionally illiterate.

Illiteracy has both personal and societal repercussions. Low literacy skills reduce earning potential. The National Adult Literacy Survey ([NALS] Kirsch, et al., 1993), found that the weekly earnings for individuals rated at the lowest level of literacy was one-third that of people who had scored highest on the scale. Men, aged 25-40, who have less than high school level skills lose over $240 billion in lifetime earnings (Robson, DeVergilio, & DeButts, 1990). The cost of illiteracy to society also is high. Business loses an estimated $225 billion to nonproductivity, and is unable to find enough employees with adequate basic literacy skills to fill vacant positions or to be trained for high-tech jobs. Taxpayers also bear the cost of illiteracy. Approximately $5 billion is spent for public assistance to support people who are unemployable due to illiteracy. An additional $6.6 billion is spent yearly on prison maintenance for an estimated 260,000 inmates whose incarcerations are literacy related (Kozol, 1985).

Based on these statistics, a minimal literacy level for successful inclusion in a productive, technological workplace appears to be high school level reading and writing abilities. NALS findings (Kirsch et al., 1993) revealed a notable difference between the performance of adults who completed secondary education and those who did

not. On average, adults with either a high school diploma or General Educational Development (GED) certificate demonstrated proficiences at the high end of Level 2 (completed tasks requiring low-level inferences or integration of two pieces of information), whereas adults with less than a high school diploma performed primarily within Level 1 (read short texts to locate a single piece of information with little distracting information present). Furthermore, Mikulecky (1986) documented that the readability level of much of the on-the-job reading material falls between the tenth and twelfth grades. Consequently, high school level literacy is the goal of many adult literacy programs, with a GED being one measure of success. Unfortunately, many individuals entering literacy programs are far from this goal.

When literacy is viewed along a continuum of skills, a relatively high proportion of the total population possesses a basic level of literacy that would enable them to obtain a high school diploma or GED. However, 21-23% of the population scored at Level 1 (Kirsch, et al., 1993). Low-literate adults, especially those with the lowest reading skills, are less likely to participate in any type of adult basic education (ABE) program than adults with more educational experience (Hill, 1987). The National Advisory Council in Adult Education (NACAE, 1987) reported that less than 5% of illiterate adults participate in ABE, even though individuals whose reading

performance is at NALS Levels 1 and 2 (approximately fifth grade level and below) are considered the target population (National Education Goals Panel, 1994; Office of Education, 1975). Even if enrolled in a literacy program, progress for low-literate adults may be difficult. Kirsch, et al. (1993) reported a significantly higher proportion of disabilities in individuals performing at Level I as compared to the general population. Between 53% and 60% of the adults reporting either a speech or learning disability performed at Level I.

## Summary

While there is no consensus definition, literacy increasingly is being viewed in terms of functionality. National survey results indicate high school level reading and writing ability as a minimum skill level for functioning productively in the workplace. However, more than 20% of the adult population demonstrate skills below that level. A significant portion of these adults may present some type of learning problem. For low-literate adults to increase their performance level, reading instruction must be effective. For instruction to be effective, literacy providers first must know how adults learn to read.

## Reading Development in Adults

Little is known about the reading processes of adults with low literacy skills. The literature base in the

field of adult literacy is comprised primarily of discussions on how to define and measure literacy, descriptions of programs, how-to manuals, and the role of technology in adult education. Reading instruction for adults with low literacy skills has been derived from research on the reading development of children. However, researchers recently have begun to obtain descriptive data on the reading development of adult low-ability readers.

Chall (1983) presented a six-stage developmental model of reading, based on behaviors typically exhibited by children in the process of becoming literate. She proposed that, with the exception of the beginning stage, these stages are similar for adult low-ability readers. Chall's stages of development may be grouped in three general categories: prereading, learning to read, and reading to learn. Stage 0, prereading, refers to the development of concepts about reading through exposure to literacy events such as storybook reading. Learning occurs in a holistic manner as children experience and witness language and print being used in meaningful and purposeful activities. Chall does not consider this stage relevant to adults with low literacy skills because they already speak and understand the words they need to read. Their difficulty lies in not knowing the printed medium.

Stages 1 and 2 are the "learning to read" periods of development. In Stage 1, initial reading or decoding, the focus shifts from a holistic, meaning-based understanding

of reading to an emphasis on print. Readers at this level are often described as being "glued" to the print as they learn the sound-symbol correspondences required for quick and accurate word recognition. A shift from this overreliance on print to fluency occurs at Stage 2, called the confirmation, fluency, ungluing from print stage. Basic decoding skills are internalized so that now the reader can begin to integrate print-based and knowledge-based strategies. Fluency is increased through reading books with familiar content, vocabulary, and sentence structure. Because the material is familiar, the reader can begin to attend more to meaning.

The final three stages are classified as "reading to learn." Stage 3, labeled reading for learning the new, marks a major shift in the purpose of reading. Automatization of decoding skills, learned and refined in the previous stages, has freed up attentional resources so that the reader now may focus on text comprehension and acquiring new information. According to Chall, it is during Stage 3 that a reader's vocabulary and prior knowledge begin to play an important role in reading. Stages 4 and 5, multiple viewpoints and construction and reconstruction - a world view, are also meaning-based stages. These levels are extensions of Stage 3 in that the focus is on reading to learn, but more advanced because the reader now can manage ideas from multiple viewpoints and, through analysis, synthesis, and

evaluation, can construct their own knowledge, taking multiple perspectives into account.

Chall (1983) proposed that low-literate adults progress through the same stages of development as typically developing readers but, like children who are poor readers, at a slower pace. However, there is disagreement as to whether adults with low reading skills exhibit similar patterns of performance as children. In a study of college students who were nonproficient readers, Raisner (1978) found that the adults relied more heavily on print-based cues and utilized syntactic cues less than do children. An investigation of the reading strategies utilized by low-literate adult readers in an ABE program (Malicky & Norman, 1982), revealed additional differences. While children who are good readers correct more errors that distort meaning than poor readers (Beebe, 1980) adults demonstrated a different pattern of self-correcting behavior. Adults who were not progressing corrected more semantic errors (e.g., stood for scooted in Billy scooted under the blanket) than did the readers who were improving.

In addition to the differences discovered between adult low-ability readers and children, Malicky and Norman (1982) noted differences in the use of reading strategies between adults who made progress (i.e., the gain group) and those who did not (i.e., the no-gain group). At the beginning of the treatment study, the no-gain group

evidenced a heavier reliance on the graphic cuing system and less reliance on the grammatical cuing system than did the gain group. This suggests that the no-gain subjects may have been too bound to the print to be able to fully utilized language structure cues, thereby inhibiting their progress. However, by the end of the treatment period, their use of strategies had changed. The no-gain group's post-treatment reading strategies profile resembled the more balanced profile exhibited by the gain group prior to treatment. These changes in reading strategies as reading proficiency increased may indicate possible stages in reading development for adult low-ability readers.

Based on an analysis of the reading strategies of 123 adults, Norman and Malicky (1987) identified two stages in the reading development of adults. Adult Stage 1, entitled print-based processing, is characterized by adult reading at grade levels 1-3. At this stage, readers rely equally on print-based and language-based strategies, but have difficulty integrating the processes. A change in a reader's ability to integrate graphic and language knowledge (i.e., grammatical and semantic cues) marks the transition to Adult Stage 2, integrative processing. Adults at this stage are able to read 4-8 grade level material. They make greater use of language and background knowledge with little change in the use of print-based cues.

In a later study, these same researchers proposed another stage in the reading development of adults. In an investigation of the literacy development of 22 nonreaders, Malicky and Norman (1989) found that the nonreaders evidenced a greater reliance on language and knowledge-based strategies than print-based strategies. This differs from Adult Stage 1 readers (i.e., readers at grade levels 1-3) who relied equally on print and language-based strategies. However, this primary reliance on language-based knowledge does resemble the reading behaviors of children in Chall's prereading Stage 0, where reading is based on language strategies and existing knowledge about the topic.

While the research thus far on stages in adult reading development evidences both similarities and differences as compared to children, a wide range of other factors distinguish the adult low-ability reader from the child beginning reader. Unlike the school-age child, there is no one place where adults assemble daily to learn. Regular and extended attendance in any educational program is difficult. Time constraints are common as participants must juggle attendance with work, family, and daily life commitments (Darkenwald & Valentine, 1985). Adult low-ability readers also differ from child beginning readers in maturity level. While the adults bring more knowledge and life experiences to the learning process, many also have more negative school-related memories.

Fear of failure, lack of self-confidence, embarrassment, and frustration can negatively impact reading progress (Hayes, 1988; Kitz, 1988; Williams & Strange, 1990). In fact, these feelings prevent some adults from even attending "school," despite acknowledging the value of an education for their children (Fitzgerald, 1984; Quigley, 1992). Others, however, are motivated to improve their reading skills (Beder & Valentine, 1990) and respond well to cooperatively determining their own reading goals (Vacca & Sparks, 1981).

## Summary

Research on the reading processes of low-literate adults is limited. Preliminary work has suggested three stages of reading development for adults. Findings obtained thus far indicate that the reading development of low-literate adults does not directly parallel the development of young beginning readers, although some similarities exist. First, reading in both the Adult Stage I and Chall's Stage 1 is print-based, but the adult low-ability reader's almost equal use of print and knowledge-based strategies provides evidence that the reader is not, as characterized by Chall, "glued" to the print. Second, research has revealed differences between adult and child poor readers in the use of self-correcting behaviors. Third, various affective factors evolving from adults' previous attempts at learning to read and current life circumstances have been reported to impact reading

progress. Given these differences in reading development, is reading instruction designed primarily for young beginning readers appropriate for low-literate adults?

## Instructional Models of Reading

Reading instruction for adult low-ability readers mirrors that traditionally provided to young beginning readers and children who are poor readers (Winser, 1992). These approaches tend to be psycholinguistic in nature. Instruction either emphasizes print as the basis for reading (i.e., bottom-up model) or stresses the importance of the reader's existing knowledge and ability to use context (i.e., top-down model). However another position, the interactive approach, views reading as a simultaneous interaction between both bottom-up and top-down aspects of reading. A program's orientation toward one of these models typically determines the type of instruction provided. This section will include a brief description of the reading approaches commonly utilized in adult literacy programs and rationale for their use.

### Phonics

Phonics represents the philosophy of bottom-up processing. Within this model, reading is viewed as the accumulation of discrete, hierarchically-organized skills. Accordingly, instruction focuses on the elements of language (letters, sounds, words) and rules for their use. Through a series of sequential and structured steps, readers are taught sound-symbol correspondences that

progress from simple to complex. Mastery of these skills is viewed as a first and necessary step for comprehension.

Phonics-based instruction is one of the most common approaches utilized with low-literate adults (Fingeret, 1984; Meyer & Keefe, 1988). Several factors may be contributing to its popularity. First, longitudinal studies have shown that an awareness of and ability to manipulate the phonological segments of words is a powerful predictor of reading achievement (Stanovich, 1985; Velluntino & Scanlon, 1987). Adult low-ability readers, like their younger counterparts, demonstrate poor awareness of the phonological structure of words and difficulty segmenting words into their phonemic parts (Liberman, Rubin, Duques, & Carlisle, 1985; Morais, Bertelson, Cary, & Alegria, 1986; Pratt & Brady, 1988; Read & Ruyter, 1985). This lack of facility with the code results in poor word identification strategies. Without automatic and effortless word recognition, valuable cognitive resources deemed necessary for comprehension are no longer available (Catts, 1991; Perfetti, 1985). Phonics instruction provides a means for directly addressing the phonological deficits while building a foundation for fluent reading and comprehension.

A second reason for the frequent use of phonics relates to the instructors. Reading instruction in many literacy programs is provided by part-time employees or volunteer tutors with little or no training in teaching

reading. Consequently, the instructional materials must be simple in design and implementation. Phonics instruction can be systematically implemented using worksheets, computerized drills, and other materials that can be reliably put into practice by following explicit directions (Rogers, 1987).

Finally, many low-literate adults perceive reading as a word decoding task and expect instructors to teach word decoding skills (Roscow, 1988). In reports from several studies (Fagan, 1988; Gambrell & Heathington, 1981; Keefe & Meyer, 1980; Norman & Malicky, 1986), poor readers consistently described reading as a word identification task. When meaning was related to reading, comments indicated that meaning was viewed separately from reading (e.g., "I can read well but comprehension of vocabulary is low."). Not surprisingly, current concepts of reading are influenced by prior reading experiences. Fagan (1988) found that adult low-ability readers' concept of reading results from the type of literacy instruction to which they had been exposed. Teachers of children in third, seventh, and eleventh grade utilize fewer instructional approaches with poor readers than good readers. The approaches used emphasize decoding strategies rather than comprehension or critical thinking (Applebee, Langer, & Mullis, 1988). Poor readers, in turn, reported using fewer types of strategies to guide their own reading.

## Sight Word

Sight word instruction (also referred to as look-say or whole-word) represents another subskill reading approach used frequently with adult low-ability readers (Lerche, 1985; Rynders, 1987). Proponents of sight word instruction reject the idea that reading is a letter-by-letter decoding process; rather the basic unit of meaning is the word. Learners are taught to recognize whole words on sight through repeated exposure either with isolated word lists or in the context of a sentence. Repetition may be provided through exercises utilizing flashcards, computerized drill-and-practice programs, or vocabulary worksheets. Any reference to letters or sounds occurs in the context of a word. For example, a reader may be asked to hear the similarity in the beginning of the words start and stop, or see the differences in the words through and thought, but the reader would not be asked to "sound out" the word.

Although sight word instruction does not begin with the smallest elements of language, like phonics, it operates under the premise that reading is an accumulation of simple skills that are gradually built into more complex skills. Instead of beginning with letters and sounds, instruction begins with words. Learning to read is a matter of identifying more and more written words. When a sufficient sight word vocabulary is established, meaningful reading may begin.

Several advantages of sight word instruction over phonics instruction for adults have been proposed. First, the vocabulary taught can be tailored to fit the interests and conceptual development of adults. Most phonics-based reading materials limit vocabulary to those words that reinforce the phonetic pattern being taught, resulting in uninteresting stories with artificial sounding language (Meyer & Keefe, 1988). Second, by utilizing whole words as the smallest unit of language, the reader is not required to learn letter-to-sound correspondences and phonics rules prior to reading. Since many adult low-ability readers evidence poor phonological awareness and phoneme segmentation skills (Liberman & Shankweiler, 1985), the use of sight words allows reading instruction to bypass this deficient area.

## Language Experience Approach

One of the primary differences between the young beginning or poor reader and adult poor readers is that adults bring more background knowledge and language experience to reading. To capitalize on adults' prior knowledge, many adult literacy providers have begun to utilize the language experience approach (LEA) with low-literate adults (Calvin & Root, 1987; Jones, 1981; Lerche, 1985). LEA is based on the oral language of the adult learner. The adult dictates an experience that is transcribed by the instructor. The dictated story becomes the text for future reading lessons. Ease of reading is

facilitated because the story is written in the learner's own oral language patterns using vocabulary and content that is familiar and of interest to the individual. This known information is assumed to assist the reader in acquiring the unknown conventions of written language.

LEA represents a more holistic approach to teaching reading than either phonics or sight word instruction. From the outset, LEA immerses the learner in reading as a meaning-making process. Skills may be addressed, but this instruction occurs as the need arises in the context of reading whole texts.

Several advantages of employing LEA with nonreaders and beginning adult readers have been articulated. First, there is a lack of interesting, age-appropriate materials for adult beginning readers (Lehman, Johnson, & Lehman, 1992). The self-generated texts fill this void in available published material. Second, because the texts are generated by the learner, the topics are relevant and timely. Malicky and Norman (1989) noted that beginning readers make greater use of knowledge-based strategies when reading predictable text. The predictable nature of the stories allows for immediate success for even the lowest readers. The relevance of the materials to the adults' lives and their ability to experience some early reading success is extremely important when drop-out rates are considered (Schierloh, 1992). Fagan (1987) reported a drop-out rate of more than 50% for low-achieving adults.

More distressing, Mikulecky and Drew (1991) noted that more than half of the new participants in adult literacy programs drop out before completing the first two weeks.

Yet, LEA is not without its detractors. Critics question the advisability of using the learners' own language as text material. Adult narrations transcribed verbatim may contain grammatical errors. While some practitioners insist that maintaining the exact wording will assist the reader in connecting meaning to print, others believe a correct model of Standard English should be presented. Another concern relates to vocabulary development. Utilizing the learners' own words limits their exposure to new vocabulary that is likely to be found in texts they ultimately may want to read. The question then becomes how and when is new vocabulary incorporated into the instructional material.

## Summary

Phonics, sight-word instruction, LEA, or a combination of these three approaches currently dominates reading instruction for low-literate adults. Both phonics and sight word instruction represent the bottom-up approach to reading instruction, although they differ on the level of subskill at which instruction begins. Phonics proponents advocate teaching the alphabet and sound-symbol associations first to address the phonological deficits exhibited by adult low-ability readers. Supporters of sight word instruction suggest

their approach is more suited to adult low-ability readers because it begins at the word level and bypasses the phonological difficulties. LEA abandons the bottom-up model of reading, using instead a top-down approach. Through the self-generated texts, LEA allows readers to use existing language knowledge and background experiences to learn the conventions of written language.

Regardless of the differences, the widespread use of each of these methods suggests all are effective in increasing the reading performance of low-literate adults. The following section will review existing data on the efficacy of these instructional methods with low-literate adults.

## Measures of Reading Progress

The efficacy of reading instruction with low-literate adults within ABE and other adult literacy programs is unclear. A variety of factors appear to have contributed to the paucity of meaningful data despite the existence of numerous literacy providers. These include limited requirements to report progress, accountability based on measures other than reading progress, use of informal instruments such as self-reports or reading attitude surveys to report changes in reading behaviors, and validity of reporting reading progress through scores related to school grades. A representative sampling of various measures of progress employed by a variety of

literacy providers will be highlighted in the following two sections.

## Nonreading Measures of Progress

Many agencies serving low-literate adults are not required to report student progress to maintain state and federal funding (Bishop, 1991). When accountability is required, a program's success may be determined through measures other than reading progress including number of adults served, attendance, retention of participants, or number of GEDs obtained (Padak & Padak, 1991). Programs that do address the issue of reading improvement often utilize self-reports or reading attitude surveys. Positive reports on a variety of reading behaviors (e.g., increased enjoyment of reading, read more types of printed materials, increased self-confidence in reading ability) serve as indicators of the programs' success.

A minority of programs provide no assessment of student progress or program success. The "Read Campaign" adult literacy program, established in 1980 and offered through the Ft. Lauderdale, Florida public library, provides an extreme example of one such program (Seager, 1993). Read Campaign, in accordance with the library's philosophy that the learning process be free of testing and measurement, does not engage in any manner of student evaluation. Several reasons may be driving the resistance to any type of program assessment. First, results of standardized tests are not seen as true indications of

personal learning. Higher reading achievement scores do not, necessarily, reflect the attainment of functional reading goals (e.g., reading street signs, passing a driver's license exam, helping children with homework, or reading the Bible) expressed by many low-literate adults (Hunter & Harman, 1979).

Second, the library maintains that all methods and procedures used in the literacy program be non-authoritarian and non-threatening. Testing of any type is viewed as authoritarian because the information would be utilized by program personnel to make decisions for the adult learner. Standardized tests are considered threatening because their administration forces low-literate adults to engage in an activity at which they have failed in the past. Even goals are viewed as a measure of success or failure, therefore, tutors are instructed not to set educational goals for students. Goals may be developed only at the request of the adult learner.

Evaluation procedures for documenting the overall success of the literacy program also are notably absent. Read Campaign does not engage in any nonreading measures of program success such as retention rate or program completion. Such measures are thought to bias programs toward serving the easiest to reach populations, and so are not recorded.

Like the Read Campaign, the Mexico-Audrain County Library Project L.E.A.P. in Mexico, Missouri provides literacy services without conducting any type of student assessment (Seager, 1993). If the enrolling individual reports there is a problem with reading and comprehension, instruction begins with the first book of the Laubach series (Laubach, Kirk, & Laubach, 1991). Student progress that would necessitate a change in reading materials or instruction is determined through informal observations made by the tutor after working with the adult for an unspecified length of time.

Other programs maintain similiar views regarding the problems inherent in formal evaluation of reading, although some measures of program effectiveness are maintained. The Athens-Clarke County Public Library in Athens, Georgia adopted a client-centered philosophy that focuses on the individual goals of low-literate readers (Seager, 1993). Rather than administering standardized tests, the literacy program's success is illustrated through data on the number of adults served and on the tutor's anecdotal accounts of student progress. However, more quantitative information on students' reading progress may become available if computer assisted learning is integrated into the tutoring program. This procedure fits the library's philosophy because adult learners' performance could be unobtrusively measured through features intrinsic to the software programs.

The literacy program conducted through the public library in Duluth, Minnesota relies heavily on computer technology to provide services to adults with low reading skills (Seager, 1993). Although current language skills are assessed at the initial interview to determine the focus for the individualized reading instruction, no posttesting is conducted to measure reading progress. Rather, statistics on computer and software use, number of adult low-readability materials circulated, inquiries about the literacy program, and tutor-student information provide documentation of program success.

Mississippi's Project LEAP (Learn, Earn, and Prosper), a statewide satellite distance learning program in basic literacy skills, personal improvement, and GED preparation, employs a variety of nonreading measures to document success. Many of these measures involve transfer to another program or completion of a goal, such as obtaining a GED. Meek (1993) reported that in the first six months of the program, 79% of LEAP students in the GED-preparation level received GEDs, 16% became employed, 13% entered a community college or other training program, and 5% were removed from public assistance. No indication of changes in reading ability associated with any of these measures was provided. Another 30% were reported to have progressed to a higher learning level, although no information was provided on how improvement was documented

or if the gains were in reading or other basic skills areas.

The documentation procedures reviewed thus far have focused on nonreading measures of progress considered to be less threatening or stressful for adult learners than standardized testing. Yet, some literacy providers must report objective data on student progress, program success, or both, to maintain funding (Lerche, 1985).

## Reading Measures of Progress

Literacy programs that document progress in reading performance through objective measures typically report these changes either in grade-equivalent scores (GESs) or reading grade levels (RGLs). However, many adult literacy educators have questioned the validity of reading scores that reference adult reading performance in relation to grade levels in school (Bruce, 1981; Freire, 1970; Heathington, 1987; Lytle & Schultz, 1990). These educators cite the differences in reading requirements of school-age children with the real world reading encountered by adults as a primary objection. Adults' reading material differs from the narrative and expository text of the school setting. It is highly varied including text related to jobs (e.g., work orders, inventory lists, employee manuals), children (e.g., letters from school, homework assignments, directions for medicines), and daily living needs (e.g., lease agreements, bills, church notices, income tax forms, product labels). This section

will examine the meaning of GESs and RGLs, and their validity in documenting progress for adult low-ability readers.

Grade-Equivalent Scores

Grade-equivalents are scores obtained from standardized tests. Standardized or norm-referenced reading tests are typically comprised of subtests that assess word recognition skills, reading vocabulary, and comprehension. The tests are constructed to include material that covers a broad range of ability levels. Only a few items at each grade level are included to limit testing time while sampling a broad range of skills. Correct responses are tallied and the resulting raw scores are converted to GESs to allow comparison of the examinee's performance to that of the norming population. For example, if a raw score of 72 equals a GES of 4.3, the implication is that 72 was the median score of the norm group tested in the third month of fourth grade. However, this score could reflect items responded to correctly or missed at grade levels much lower or higher than the GES, since the total points scored is normed rather than the actual performance at that grade level.

Therefore, the name is misleading because a grade equivalent does not mean that a person can read text at a readability level commensurate with the GES. It is not an estimate of a person's instructional reading level. Consequently, a GES does not provide literacy educators

with information on how a reader performs on functional reading tasks. Nor does a GES provide information on the particular skills a reader has. The score simply relates the examinees' performance to those in the norming population (Farr & Carey, 1986; Horst, 1976).

Other problems exist when literacy programs use GESs to report individual or group reading progress. GESs are not based on equal-interval units (Horst, 1976). An increase of one grade equivalency may not represent the same degree of change in reading performance across the grade equivalency levels. For example, in terms of raw score points, a year of growth at one point on the scale may be attained by responding correctly to seven questions, while three correct answers at another point of the scale also results in a year of growth. In other words, an increase of one grade-equivalent does not have the same value at all grade levels.

Programs measuring student reading progress in GESs typically average the scores of all participants and report a mean GES for the group. However, GESs should not be averaged because the scores do not have equal intervals throughout their ranges. To average these scores may distort data such that effective programs appear ineffective or vice versa. Venezky, Bristow, and Sabatini (1994) found that for populations smaller than 200, a major portion of the yearly gain reported for adult literacy instruction can be accounted for by the

inconsistencies in grade-level intervals. Therefore, whereas scores from standardized testing meet the requirement that literacy programs report quantifiable data on reading progress, they do little to reflect the reading ability of adults and may produce data that inaccurately reflects the effectiveness of the instruction.

Reading Grade Level

Like grade-equivalent scores, RGLs provide a measure of reading ability by referencing a reader's performance to a specific level of school performance. However, the meaning of the score is quite different than a grade equivalent. RGL is based on the reader's ability to recognize words and comprehend actual connected text, rather than discrete reading skills. The connected text is written to conform to a readability level that is normed to correspond with expectations maintained for increasing grade levels. That is, first grade reading expectations are characterized by simple sentences with literal meanings, while advanced grade level expectations include the processing of complex sentences and figurative, inferential interpretations of the text.

Text characteristics. Reading grade level comprises both the attributes of the written text, and the mental representations of the text that a reader is capable of reconstructing during reading (Rothkopf, 1985/1976). To succeed at a specific level of readability, the reader

must be able to reconstruct the author's meaning by processing the language used by the text to refer to these meanings. RGL thus reflects an interaction between the reader and the text (Bruce, 1981).

The characteristics of the text have been described according to factors that can be categorized according to their (a) content, (b) representation, and (c) form (see Table 2-1). Content factors are related to the meaning or purpose of a given message. Content requires that a text be complete, accurate, goal-oriented, and contain relevant information to correspond with the goal of the passage.

Table 2-1

Text Characteristics Related to Readability Level

| Content | Representation | Form |
|---|---|---|
| Completeness | Lexicon | Structure |
| Accuracy | Exposition | Complexity |
| Goal orientation | Organization | |
| Relevance | | |

These factors are each defined and constrained by the purpose of a text, or what it is supposed to accomplish. For example, the degree of completeness at which a topic must be discussed is relative to the intended audience and purpose (Rothkopf, 1985/1976). A naive audience may require a superficial summary of a topic if the purpose is to create a general awareness, or a lengthy, detailed

presentation if the purpose is to increase the reader's level of expertise.

The content of text may be expressed using three classes of representation, that is, lexical, expository, and organizational. Lexical representation refers to the words that are used by the text to represent meaning. Lexical representativeness is influenced by the concreteness, vividness, meaningfulness, and familiarity of the text. Generally, representation is estimated based on the likelihood that given words have been encountered by a reader, and the nature and variety of contexts in which they have been seen.

Exposition refers to the presentation of concepts and relationships that are not captured by single words. Expository expressions include metaphors, similes, and defining or referential phrases contained within a text. The representations communicated using words and expository expressions are further represented by the order in which they occur within discourse. Order, or more specifically, organization and sequence, can be used to represent a temporal sequence, a causal relationship, or an intentional plan (Stein & Glenn, 1979; Rothkopf, 1985/1976).

The third major characteristic of text, or form, refers to the grammatical properties of the sentences that comprise the text. Considerable experimental research in reading has demonstrated that simple sentences are easier

to read, are reacted to more quickly, and are remembered better than more complex transformations of the same sentence (Carroll, 1971; Schlesinger, 1966). Longer sentences also are more difficult to understand unless the length is created by conjoining simple sentences using a conjunction such as and.

The content, representation, and form of text interact dynamically to create a text that either is comprehensible to a reader, or one that is too difficult for the reader to reconstruct. Measuring the characteristics of a text in some quantifiable manner to assess the level of difficulty that it represents is the role of readability.

Readability. Readability is a quantitative index of the characteristics of a text. To arrive at a designation of difficulty, formulas are applied to the text in an attempt to capture the difficulty of the content, representation, and form present in the language. By 1963, thirty-one different readability formulas had been proposed, and variations of these have been invented since (Klare, 1963). Some formulas attempt to assign numerical values to capture the degree of syntactic complexity in a sentence, while others incorporate measures of the frequency of a word's occurrence in a language (Thorndyke, 1973). Regardless of the specific measures, all of the formulas are designed to predict reading difficulty using indices derived by analyzing the text.

Properties of a text, such as its accuracy, organizational structure, coherence, relevance, and goal orientation are all acknowledged elements of text readability, but at present no simple, convenient formula that accounts for these elements exist (Newman, 1980). Similarly, characteristics of the reader, such as prior knowledge, language proficiency, and purpose for reading interact to affect readability, but these, too, are difficult to measure. Consequently, more concrete aspects of the representation and form of the text are typically used to derive a readability level.

The two elements of representation and form that have been shown to be the most reliable predictors of reading difficulty are word difficulty and sentence complexity. Consequently, these two factors are included in nearly all readability formulas (Zakaluk & Samuels, 1988). One reason that these factors are reliable predictors is their simplicity of calculation. In most readability formulas, both of these factors are estimated based on length, as in the number of syllables per word and the number of words per sentence. Both of these indices are easy to count and objective to score. Variations from this basic readability formula are derived from the number of other indices that are factored into the calculations, such as the number of morphemes (i.e., plural and verb tense markers, derivational prefixes and suffixes), or the ratio of simple to complex sentences (Klare, 1963).

Word length is most closely tied to lexical representation. According to calculations made by Zipf (1935), word length is negatively related to the frequency of occurrence of that word in a language. This principle, referred to as Zipf's law, is closely related to what Zipf calls the psycho-biology of language. Generally stated, this law suggests that words that refer to concrete, observable objects and events within the environment evolved first in symbolic language and were represented using simple word structures, such as single-syllable, consonant-vowel-consonant constructions. Thus, words like eyes, nose, cat, sit, see, hear, and so forth are of this type. As words increase in abstraction and become more symbolic, they are represented by more complex syllabic shapes (primarily because most of the allowable simple combinations of the language have already been used to refer to concrete concepts).

This generative property of a language allows for an infinite number of words to be generated from a finite number of sounds. The interaction between the abstraction of a word and its syllabic representation can be exemplified by reference to a ball. The label for the object, ball, fits the CVC syllable pattern. At a more abstract level, the ball can be described as having color. Color is a property that requires a representation of one specific property of the ball, and not the concrete object itself. The word color has a more complex syllabic shape

than the word ball. At an even greater level of abstraction, the ball can be categorized as sports equipment. The word equipment captures an aspect of the ball related to the context of its use, and not its physical characteristics. The word is concomitantly more complex in its syllabic structure, and less frequently occurring in the language. This logic can continue, referring to the ball as recreational or functional, but rarely appreciated or decorative (Blank, Rose, & Berlin, 1978; Zipf, 1935).

The more abstract words, such as recreational or decorative suggest another property related to the number of syllables in a word, that is, the presence of morphemes that inflect the word. Inflectional morphemes are meaningful units of language that cannot stand alone as lexical items, but when added to a vocabulary word can modify the meaning. This allows for efficiency and generativity within a language. For example, instead of using word order to communicate a characteristic such as number, as in more than one ball, a single morpheme can be added to the base word to capture this meaning (e.g., balls). A plural represents an inflectional morpheme, or a simple modulation of the root word that does not change its basic semantic or syntactic properties.

However, at a more complex level, a special class of derivational morphemes enables a word to function differently, both semantically and syntactically. For

example, the word decorate, a verb, refers to the act of adorning something to make it more attractive. By adding the morpheme ive the semantics can be changed to mean something that is attractive, now functioning within a sentence as an adjective. This abstract ability to derive a new meaning from an existing lexicon without inventing a new word generally results in the addition of at least one syllable to the root word form.

These properties of the lexicon result in two plausible assumptions made by readability formulas. The first assumption is that the more frequently occurring words in a language are those that are more likely to be familiar and meaningful compared to words that rarely appear. The second assumption is that more familiar and frequently occurring words are likely to be simpler in their form than less familiar and more abstract words. Research has supported this assumption with positive correlations between word length, word frequency, and word familiarity (Rothkopf, 1985/1976).

However, the relationship between word length and text complexity, although positively related to readability, is misleading when used by itself. This is because most function words in the language such as articles (e.g., a, the, an), relative clause markers (e.g., that, who, when), conjunctions (e.g., and, but, so), and other clause markers such as infinitive to or prepositions, are often short, simple CVC words. These

function words operate as syntactic devices that add considerable complexity to the text. Their frequency of occurrence may mask the complexity of the text and artificially reduce the calculation of the readability when word length is used by itself. Consequently, readability formulas also include a measure of sentence complexity, usually sentence length, in their derivation (Klare, 1963).

Sentences can be categorized according to three levels of complexity, that is, simple, compound, and complex. Simple sentences are composed of an independent clause that includes a noun phrase (NP) and a verb phrase (VP). The phrases are structured in a set NP + VP + NP relationship to communicate a single idea or proposition (e.g., Dad bought a present).

Compound sentences result when two independent clauses are combined into one sentence by a conjunction such as and (e.g., Laura played with the dog and Brant rode his bike.). Because compound sentences are longer than simple sentences, it appears that they are syntactically more complex, and therefore more difficult to comprehend. However, research has shown that lengthening sentences by the use of conjunctions does not have a significant effect on comprehension (Coleman, 1962; Tavakolian, 1981). Compound sentences, although longer, may not be more difficult to comprehend than simple sentences because the syntactic complexity, or the basic

NP-VP-NP structure, of the sentence does not change (Cairns, 1996).

The creation of complex sentences disrupts the NP-VP-NP of simple and compound sentences through the process of embedding. Embedding involves the addition of detail, specificity, or clarity to the main clause through the insertion of phrases or clauses. For example, the simple sentences: Mother was angry, Her son was late, and He did not call can be combined into one complex sentence Mother was angry with her son because he did not call when he was late. The sentence appears easy because the function words (i.e., with, because, when) used to create the complex sentence are simple one- and two-syllable words. However, in order to accurately reconstruct the text's message, the reader needs to understand the relationships marked by the function words. In this example, mother was not angry at everyone. The preposition with signals that it was her son who was the recipient of her anger. The first subordinating conjunction because specifies the cause of her anger (he did not call). However, the presence of the second subordinate clause when he was late attaches a temporal condition to the causal relationship established by the word because. The son is not expected to call whenever he is out or away from home, only at those times when he is going to be late.

Through linguistic markers such as articles, prepositions, conjunctions, and relative pronouns, the

length and syntactic complexity of a sentence can be increased substantially without a corresponding increase in word length. The creation of the complex sentence in the above example only added a total of five syllables (from four words) to the word complexity count, yet the syntactic structure required the reader to coordinate causal and temporal relationships between the agents and actions to reconstruct the meaning of the sentence. Including a measure of sentence length in readability formulas is one means of capturing the syntactic complexity function words add to a given reading passage.

## Summary

Although both GESs and RGLs reference reading performance in relation to school grade levels, an examination of their underlying properties indicates fundamental differences between the two types of scores. These differences preclude making direct comparisons between programs that document reading progress utilizing GESs and those using RGLs. RGL scores, because they are based on the readability level of a given passage, provide an indication of the reader's ability to process the language of a text. A gain in RGL reflects the reader's greater proficiency and facility recognizing increasingly abstract and less familiar words, and understanding multiple relationships expressed in syntactically complex sentences. This increased proficiency is evidenced through the reader's improved accuracy, fluency, rate of

reading, and comprehension. Furthermore, because RGLs result from adults' reading of connected text, they provide a better indication of a person's functional reading skill than do GESs.

## Efficacy of Reading Instruction for Adults

In addition to the issues surrounding the manner in which reading progress should be measured and reported, other obstacles make evaluating the effectiveness of adult literacy programs difficult. Objective measures of reading gains, either GESs or RGLs, are often not available to report because standardized or formal reading assessment was not conducted. There are many reasons for this reluctance to test. Few tests developed specifically for adults are available. Programs frequently minimize initial testing because of the negative experiences many adult low-ability readers have had in the past (Vacca & Sparks, 1981). Administering a battery of tests upon entry into a program deters many would-be participants from returning for their first instructional session.

Standardized testing is often replaced with interviews, questionnaires, checklists, or short criterion-referenced tests. Many programs employ competency-based or criterion-referenced tests specific to that agency. While informal measures such as these provide the agency with baseline data from which to plan instruction and evaluate progress, they do not allow for meaningful comparisons across programs.

Some competency-based assessments are standard across a large number of agencies allowing for comparisons. In California, all literacy programs who receive U.S. Adult Basic Education funds utilize the Comprehensive Adult Student Assessment System (CASAS) (Metz, 1990). The CASAS, comprised of a list of competency statements (e.g., identifies months of years and days of week, uses table of contents or indexes, interprets product labels, interprets general work-related vocabulary, uses library sources), is administered pretest and posttest to all program participants. Data is reported in scaled scores with a score below 200 indicating difficulty with basic reading survival skills. These scores allow for comparisons of instructional effectiveness between participating agencies but prohibits comparisons with other programs.

The dearth of well-designed, controlled studies with generalizable results also may be due, in part, to the nature of the field of adult literacy. Adult literacy education is not an established professional field (Imel, 1988). Literacy programs typically are staffed by part-time personnel or volunteers. As such, research is not a primary activity (Newman & Beverstock, 1990). Consequently, much of the quantitative data reported in the literature simply consists of pretest and posttest scores for any adult who attended classes for a measurable length of time.

This lack of a research focus has created a situation where instructional methods have not been investigated in any systematic manner in which dependent variables for reading are identified. Thus, the effects of different instructional methodologies on those variables has not been investigated. Subject groups also have not been delineated, thereby preventing any evaluation or comparison of the instructional effects for adults at different reading levels. Furthermore, the data obtained is not generalizable to the low-literate population as a whole. A majority of literacy programs maintain an open-exit policy, allowing adults to terminate participation without notice. Consequently, most of the data collected is from a self-selected group of subjects who are motivated to continue. These adults may be substantially different from those who drop out or never attend a program.

Efficacy data on adult reading programs will be reported in the following two sections. Findings obtained from agency reports on the reading progress of adult participants will be provided first, followed by results obtained from experimental studies with adult low-ability readers.

Uncontrolled Studies

Established in 1986, the Learning to Read Program in Boulder, Colorado regularly conducted program and student evaluations through standardized tests, competency-based

tests, student and tutor progress reports, and retention figures (Seager, 1993). In addition to the initial enrollment interview and skill level assessment, follow-up phone interviews were conducted every three months, and reading assessments are updated after every 75 hours of instruction. Reading gains averaging two grade levels for each year of enrollment (100 tutoring hours) have been documented. Instruction within the program was eclectic in nature including both skill-based methodology and holistic practices (D. Sherry, personal communication, April 29, 1996). A tutoring session included use of any combination of the following practices: phonics, word patterns, sight word instruction, LEA (especially with beginning readers), finding the main idea, or the directed reading approach (i.e., asking yourself what the passage is about and making predictions).

Industry-based literacy programs have also reported success. Project Power, a workplace literacy program, reported average reading gains of .67 to 1.5 GES for employees participating in 48 hours of reading instruction over a 12-week period (Center on Education and Training for Employment, 1990). Project Power was developed in response to employers' requests for a program to improve workers' basic communication skills. Reading materials specific to each company were incorporated into instruction. Participants completed evaluation questionnaires at the end of the course to measure

responsiveness to the program. Changes in reading performance were measured using the Test of Adult Basic Education (TABE) (CTB/McGraw-Hill, 1987).

Intensive instruction over a short period of time also has produced positive gains in reading performance. In a cooperative effort between industry and adult literacy providers, 22 employees at Valley Products, Inc. in Memphis, Tennessee, participated in an immersion reading program that provided 40 hours of instruction in four weeks (Jones, Eoff, & McDaniel, 1989). Reading instruction was provided in two sessions. The 11 employees participating in Session I ($M$ = 6.2 RGL) demonstrated significant gains in reading performance ranging from 1.2 to 3.4 grade levels. Results for the 11 employees ($M$ = 7.2 RGL) participating in Session II were parallel to that of the first group. Gains in reading performance ranged from 1.0 to 3.7 grade levels. Limited information was provided on the instructional methodology utilized in the immersion program. However, the authors did report that Session I participants received more phonetic and structural analysis practice than the second group due to their lower reading level. Instruction for Session II participants focused on vocabulary, rate, and reading comprehension.

Reading gains have also been reported for low-literate adults who receive computer-assisted instruction (CAI). Evans, Falconer, Groves, Rubin, and Mather (1992)

reported significant reading gains for 27 adults who received reading instruction through the PALS (Principle of Alphabet Literacy System) program. PALS (IBM Ltd., 1987), specifically developed for readers below the fifth-grade level, represents a bottom-up processing model of CAI. As such, instruction focused on aiding the learner in hearing the sounds in words, representing the sounds through letters, and putting the letters together to form words.

Based on pretest reading levels, the subjects were divided into three groups: (a) Group 1, grade levels 1 to 2; (b) Group 2, grade levels 3 to 5; and (c) Group 3, grade levels 5 to 7. Subjects received an average of 100 hours of PALS reading instruction. Comparison of pretest and posttest scores indicated reading gains on the Woodcock Reading Mastery Test (Woodcock, 1973, Forms A and B) ranged for 0.4 to 7.5 grade levels. While statistically significant gains were found for each group, Groups 2 and 3 demonstrated the most improvement. A mean improvement of 3.0 and 4.2 GES for Groups 2 and 3, respectively, was reported whereas less than one grade equivalency (0.9) of improvement resulted for Group 1. When individual progress was examined, subjects demonstrating the poorest sound-based word decoding skills made the least overall reading gains.

Adult literacy programs have documented gains in reading as measured by either RGL or GES for a variety of

approaches including skill-based, LEA, and CAI. Results from experimental studies will be reported next.

Controlled Studies

In a pretest-posttest control group design, Askov (1987) examined the effectiveness of CAI that utilized a "whole word" approach to teaching reading. The specially designed whole-word courseware (i.e., software) consisted of multiple choice questions, fill-in-the blank exercises, and games to teach functional words (e.g., words on an application form) and 1,000 high frequency words. The system was interactive in that the program branched to different levels and exercises in response to the user's answers.

Treatment subjects included 52 parents of Chapter I students ($M$ = 2.33 RGL). Another 24 parents ($M$ = 2.04 RGL) who had expressed an interest in the computer class but could not participate due to scheduling conflicts formed the control group. All subjects were reading below fourth grade level. Seventy percent of the subjects had not completed high school and nearly one-half had participated in a special education program at some time in their school history.

Significant changes resulted on measures of reading comprehension and word recognition in isolation and in context. Treatment subjects, who had received 20 hours of instruction over a three month period, evidenced a reading

level gain of more than one year. No significant changes were found for the control subjects.

Spivey (1993) compared the effectiveness of CAI to a direct teaching (DT) approach with 19 low-literate inmates ($\underline{M}$ = 2.7 RGL) selected from the prison's special education classrooms. Subjects were divided into two groups. Group assignment was determined by having the subjects select the instructional method they preferred. CAI consisted of educational software programs chosen to address individual goals. The software included instructional programs for word decoding and structural analysis; reading comprehension; grammar; and vocabulary, spelling, and meaning. Teachers assisted, as needed, by answering questions. The DT model utilized traditional procedures that included prereading predictions, introduction of vocabulary, oral reading, discussion, and individual work assignments. Treatment effects were measured for oral reading and reading comprehension using the Bader Reading and Language Inventory (Bader, 1983) after 10 hours of reading instruction.

Group comparisons resulted in no significant differences between the two instructional methods on measures of oral reading or comprehension. Gains resulted under both CAI and DT conditions, although the higer means favored DT. For individual subjects within the DT group, significant gains pretest to posttest on reading

comprehension were noted. CAI subjects did not demonstrate similar gains.

Summary. Reading gains for adults with low literacy skills have been reported for reading approaches using skill-based, holistic, and CAI instruction. Mean group gains measured by RGL scores ranged from 1.0 to 3.7 grade levels for 20 to 100 hours of instruction, with the greatest gains attributed to 100 hours of CAI and a four-week (40 hour) reading immersion program. Reading progress measured in GESs resulted in mean group gains ranging from 0.67 to 4.2 grade equivalents for 48 to 100 hours of instruction, with the greatest gains attributed to CAI that used a skill-based format. However, most of the reports and studies were incomplete, lacking specific information on subjects' reading level, instruments used to measure reading progress, and type of instruction employed. Thus, additional research on the efficacy of specific instructional approaches with adult low-ability readers is needed.

## Communicative Reading Strategies

CRS is a reading approach designed to facilitate the coordination of multiple levels of language involved in processing written language (Norris, 1985; Norris, 1988). Reading is viewed as an interactive, ongoing communication between the author (i.e., the text) and the reader. Through this interaction the reader constructs and reconstructs the text's meaning. The reader is supported

in this process by a facilitator who assists the reader in using prior knowledge and personal experience to construct meaning from the text. Through social mediation, the facilitator maximizes the opportunities for the reader to process the language of the text by activating relevant background knowledge, reducing the linguistic complexity of an idea, elaborating on information communicated by the text, modeling appropriate inferences, or repairing communication breakdowns. By monitoring the reader's fluency in word recognition and comprehension, the facilitator provides as much or as little assistance as the reader needs to process any unit of language.

## Supporting Research

Several recent studies have evaluated the efficacy of CRS with school-age children. Two of the studies compared the effects of CRS with the effects of other reading approaches; a third study utilized a matched control group that did not receive intervention. Additionally, CRS was investigated in one study with adult aphasics.

In a study involving third grade subjects exhibiting poor reading and language abilities, Hernadez (1989) compared the effects of CRS to a basal reading program. Changes in reading fluency, comprehension, language, and writing were evaluated after 10 hours of small group instruction (30 minutes per day over a four week period). Hernadez found that the CRS group demonstrated a statistically significant improvement in reading

comprehension compared to the basal reading group. The CRS group also evidenced greater gains in all other measures including word recognition, instructional reading level, story retelling ability, inferencing ability, spontaneous writing ability, and thematic maturity in writing. Although these gains were not statistically significant, the intervention period was extremely short. The results suggest that a longer intervention period may produce significant changes in these measures as well.

Of the measures that did not reach significance, the result on the word recognition measure was of particular interest. Even though the CRS group received no direct instruction in word recognition skills, whereas 20% of the basal group's time was dedicated to word recognition activies (e.g., phonics, vocabulary practice), equivalent gains were demonstrated. This finding suggests that reading intervention may need not address word identification skills separate from reading comprehension to produce improvement.

Badon (1993) conducted a single-subject, alternating treatment study with four first-grade poor readers to compare the effects of CRS to a directed reading approach. Subjects received two, thirty-minute instructional sessions each day for five days. Treatment effects were measured for reading accuracy, rate, and fluency; and complexity and completeness of story retelling. Although the findings were not significant for all subjects, the

signficant differences and trends in the data favored CRS intervention. The results indicated that rereading under the CRS condition produced fewer reading miscues and an increased reading rate. Story retellings under the CRS condition resulted in the inclusion of more story grammar components and episodes, more interepisodic relations, longer story retellings, and fewer maze behaviors than the directed reading approach. None of the subjects performed significantly better under the directed reading condition.

Ezell (1995) investigated the efficacy of CRS with high-risk first graders as compared to a no-treatment group. The nine experimental subjects were divided into three small groups. Each group received 45 minutes of intervention, four days a week, over a period of eight weeks. Standardized reading and language tests, and informal reading measures administered pre-intervention and post-intervention were employed to measure and compare changes. Long-term effects were evaluated through additional testing at four months and nine months post-intervention.

The results indicated that CRS is an effective treatment for young poor readers. Comparisons of pretest and posttest gain scores immediately following intervention revealed significant results for measures of word recognition, reading rate, and comprehension on both standardized and informal reading measures. Children with the poorest profiles prior to intervention made the

greatest gains. The treatment group also evidenced significantly better performance on a wide range of word analysis skills (e.g., decoding, word attack, word identification, morphemic analysis, and word ordering) compared to the control group. Results of comparisons made at four and nine months post-intervention reflected greater increases for the treatment group over the control group but gains were not significant. As with the Hernadez study (1989), the gains in word analysis and word recognition skills, in the absence of direct instruction, provide support for the effectiveness of an integrated approach to reading instruction.

An on-going, clinical program at Louisiana State University utilizing CRS with language delayed children (kindergarten through eighth grade) for the past seven years has resulted in consistent, quantifiable increases in language and reading performance on standardized tests administered at pre-treatment and post-treatment. For example, following seven weeks (20 hours) of intervention, a group of 19 subjects demonstrated an average percentile gain of 12% in reading comprehension and 6% in word recognition on the Grey Oral Reading Test - Revised (Bryant & Wiederholt, 1986), and an average percentile gain of 11% on the Test of Language Development - 2 (Newcomer & Hammill, 1988). Although not investigated in a controlled study, these clinical results suggest that CRS intervention, in a relatively short time period, can

effect measureable changes in reading and language performance with young beginning readers and middle school students.

Only one study employing CRS with adults has been conducted to date. Schutz (1988) investigated the effects of CRS on the reading proficiency of six adults demonstrating reading disturbances as a result of aphasia (an expressive and/or receptive disorder in the use of language) due to a single left hemisphere cerebral vascular accident (i.e., stroke). All the subjects, ranging in age from 45 to 78 years, were readers prior to the stroke.

Treatment effects on contextualized reading, comprehension, and isolated word recognition were measured pretest and posttest using an informal reading inventory. Weekly reading probes administered during baseline, treatment, and maintenance periods provided additional data. Subjects were divided into two groups with each group receiving intervention over a five week period. Group One participated in a simple time series design that allowed for a comparison between the subjects' performance under baseline and experimental conditions. Group Two subjects received CRS instruction during the first five week period followed by a five week maintenance period. No instruction was provided during maintenance.

All six subjects demonstrated a treatment effect for reading abilities as a result of intervention. Group

analyses indicated statistically significant improvement in comprehension, a reduction in the overall occurrence of reading miscues, and an increase in isolated word recognition ability. Short-term maintenance of the treatment effect on reading was documented for Group Two subjects, however, this effect was not universal. In other words, following treatment, some changes were significantly maintained, some dropped minimally, and others returned to pre-treatment levels.

The findings of this study demonstrate that CRS is effective, at least in the short-term, in increasing the reading performance of adults even in the presence of severe brain trauma. In addition, this study provides further data on the positive effects of a meaning-based approach on word recognition skills.

Summary

Research on the efficacy of reading instruction for adult low-ability readers is limited. Few controlled studies have been conducted and alternative instructional approaches have not been systematically investigated. Few studies have used standard measures of reading progress, making it difficult to objectively determine whether an instructional approach is or is not effective in teaching adults to read. Studies evaluating CRS instruction with emergent readers, poor readers, and adults who lost their reading ability produced positive results in word analysis skills, word recognition skills, comprehension, and story

retelling ability. However, CRS has not been examined with readers who failed to develop proficient reading despite years of instruction.

This study investigated the efficacy of CRS on the reading performance of adult low-ability readers. The specific questions addressed were (a) will adult low-ability readers receiving CRS instruction demonstrate significant improvement in reading ability compared to a control condition, (b) will CRS instruction result in an increase in the range of reading ability, or ZPD, for adult low-ability readers, and (c) will adult low-ability readers demonstrate improved coordination of reading processes as a result of CRS instruction?

## METHOD

A pretest-posttest control group design (Hedge, 1987) was employed to investigate the effects of CRS on the word recognition and reading comprehension abilities of adult low-ability readers. Experimental subjects received CRS instruction, while control subjects received skill-based instruction. Treatment efficacy was assessed through a comparison of group pretest-posttest scores. Additionally, changes in the reading performance of the CRS subjects in scaffolded and unscaffolded conditions, and across time were evaluated. Dependent measures of reading included (a) reading grade level (RGL) scores, (b) accuracy, (c) fluency, (d) rate, and (e) comprehension.

### Subjects

Subjects for this study were 12 adults recruited from two adult learning centers in southern Louisiana. Participants were chosen from a pool of 40 adults who either were referred by their respective teachers or who volunteered to participate in the study. The following criteria were used to select participants.

1. Attained a minimum age of 16 years;
2. Spoke English as the native language;
3. Obtained an instructional reading level at or below fifth grade as determined by the word recognition score on the McCarthy Individualized

Diagnostic Reading Inventory - revised edition (MIDRI-R) (McCarthy, 1976); and

4. Participated in at least 40 hours of reading instruction.

## Criteria Rationale

Adult basic education (ABE) programs are designed for individuals who are considered to be adults educationally, meaning they are beyond the age of compulsory education. In Louisiana, this age is 16 years. Consequently, this was the minimum age level established for the criterion as an adult participant.

A maximum instructional reading level of fifth grade was established as the criterion for reading performance. This level was selected because the literature in adult literacy typically describes functional illiteracy as reading skills at or below a fifth grade level (Dinnan, 1980; Powell, 1977). The MIDRI-R, an informal reading inventory consisting of 11 passages ranging from a reading level of primer to grade 11-12, was used to determine the instructional reading level of the subjects. The highest grade level passage on which a subject misread on 3-5% of the total number of words constituted the subject's instructional reading level.

One criterion for inclusion in the study was deleted during pretesting. In the original criteria, participation in the study included a requirement that

subjects perform within the average range of intellectual ability as evidenced by a standard score of 85 or above on the General Aptitude Quotient of the Scholastic Abilities Test for Adults (SATA) (Bryant, Patton, & Dunn, 1991). The SATA, a standardized test, would have provided a global measure of aptitude by giving equal weight to verbal, nonverbal, and quantitative reasoning abilities as measured through three subtests (i.e., Verbal Reasoning, Nonverbal Reasoning, and Quantitative Reasoning). However, initial testing of potential subjects indicated that this criterion was unrealistic for the population. Of the first seven individuals tested, no one scored within the average range of ability (quotient scores ranged from 53-74). Furthermore, the test scores were not notably different from those obtained on the Peabody Picture Vocabulary Test-Revised (PPVT-R) (Dunn & Dunn, 1981). Consequently, the SATA was eliminated and the PPVT-R served as the overall indicator of general language and intellectual abilities.

## Subject Selection

Potential subjects were drawn from two Project Independence programs. Project Independence offers basic skills education, enrichment, and GED preparation classes for adults receiving Aid for Families with Dependent Children (AFDC). The program's goal is to upgrade the participants' skills so they can join the work force and

become self-sufficient. To facilitate this process, Project Independence assists participants in transportation costs to the learning center and childcare expenses, but in exchange requires a minimum class attendance of at least 20 hours per week.

Project Independence sites were chosen for several reasons. First, Project Independence required regular attendance. The attendance requirement served as one means of ensuring that the subjects met the criterion of completing 40 hours of instruction. Second, the subjects' daily attendance allowed for as much as five hours of reading instruction per week. At many adult education programs, adults receive only 1-2 hours of instruction each week. With drop-out rates of over 50% typical for adult education programs (Fagan, 1987; Mikulecky & Drew, 1991), providing more instruction over a shorter time period was one method of minimizing the effects of attrition. Third, Project Independence programs are limited to AFDC recipients, therefore, the socioeconomic status (SES) of the subjects at the two sites was comparable.

Initial subject selection began from a pool of 40 women who signed consent forms to participate in the study (see Appendix B). Of those, 26 adults met the age, language, and reading criteria. All 26 adults were considered for the study. Because the two Project

Independence centers were located in different cities, random subject assignment to either CRS or control group was not feasible. Adults at Site A (located in the researcher's city of residence), who met the qualifying criteria, served as subjects for the CRS group. Adults at Site B, who met the qualifying criteria, constituted the control group. It should also be noted that, as an incentive to submit to the test battery, control subjects were paid to complete both pretesting and posttesting. CRS subjects were not paid for participation because testing was part of the regular educational program for all adults receiving instruction whether or not they were subjects of this study.

Fifteen adults at Site A met the qualifying criteria and were included in instructional sessions. Of these 15, six completed the 40 hours of instruction and posttesting. Of the nine adults who met the qualifying criteria at Site B, six completed the study. Subject attrition occurred throughout the study for several reasons. First, participation was voluntary. Subjects in the CRS group could withdraw from the study at any time and return to the regular reading program offered at the center. One student chose to withdraw from the study after 4 hours of instruction. She subsequently withdrew from the learning center. Second, attrition resulted when subjects were dropped from Project Independence rolls or were dismissed

from the center. The primary reason for program termination was lack of consistent attendance, although disciplinary dismissal also occurred. Nine subjects left the study because they were no longer attending classes at their respective sites. Finally, two subjects did not complete the 40 instructional hours required to be included in the study. Therefore, the attrition rate for this study was 50%.

Subject attrition can be a serious threat to the internal validity of group data. If subjects who did not complete the study differed significantly from those who completed the study, a treatment effect could not be determined. Therefore, because of the high attrition rate for this study, only data on the subjects who completed the 40 hours of instruction were reported and utilized in analysis procedures. However, it is interesting to note that two-tailed $t$ tests revealed no significant differences between subjects who completed the study and subjects who dropped out on any identifying characteristic or pretreatment measure.

## Subject Description

Twelve adults, including 6 CRS and 6 control subjects, participated in the study. All subjects were African American females. Table 3-1 reflects the characteristics of the subjects and the pretreatment assessment performance for CRS and control groups. The

Table 3-1

Age, Education, and Achievement Characteristics of CRS and Control Subjects

| Subject | Age | Years of School | Special Education | PPVT-R | MIDRI-R Grade Level |
|---|---|---|---|---|---|
| | | | CRS | | |
| 1 | 44 | 12 | no | 62[a] | 3.5 |
| 2 | 18 | 10 | no | 64 | 3.0 |
| 3 | 38 | 9 | no | 59 | 3.0 |
| 4 | 28 | 11 | no | 51 | 3.0 |
| 5 | 24 | 10 | yes | 79 | 2.0 |
| 6 | 30 | 9 | no | <40 | 2.0 |
| | M=30 | M=10 | | M=59 | M=2.8 |
| | | | Control | | |
| 1 | 28 | 10 | -- | 53 | 5.0 |
| 2 | 33 | 8 | no | 61 | 4.0 |
| 3 | 29 | 9 | yes | 52 | 2.0 |
| 4 | 21 | 9 | no | 66 | 5.5 |
| 5 | 31 | 12 | no | 46 | 3.0 |
| 6 | 32 | 9 | no | 58 | 5.5 |
| | M=29 | M=9.5 | | M=56 | M=4.2 |

Note. Dashes indicate that data were not available. PPVT-R = Peabody Picture Vocabulary Test-Revised; MIDRI-R = McCarthy Individualized Diagnostic Reading Inventory-revised edition.
[a]Subject beyond PPVT-R age norms.

means for subject age, years of school, PPVT-R, and MIDRI-R scores also are included. Two-tailed $t$ tests revealed no significant differences between the groups on any measure prior to treatment.

## Procedures

All testing and intervention was conducted at the subjects' respective learning center sites. Data were obtained during individual sessions, collected by the researcher and graduate students in communication disorders. The students were trained in administration of the MIDRI-R, conducting probes, and eliciting story retellings as part of their graduate assistantship duties. For CRS subjects, assessment also included establishing each subject's range of reading ability, or ZPD. Testing for the ZPD, described below, required specific scaffolded interactions, and consequently was conducted by the researcher to ensure consistent implementation of the procedure. All pretest, posttest, and probe sessions were audio recorded. CRS sessions were randomly video recorded to provide a measure of intervention reliability. This section describes procedures specific to the assessment, probe, and intervention phases of the study.

### Pretest-Posttest Assessment

In addition to determining eligibility for inclusion in the study, reading performance on the MIDRI-R provided the scores for evaluating group treatment effects. (As the MIDRI-R has no alternate form, the same form was used

at pretest and posttest.) Three scores, comprised of word recognition, comprehension, and reading rate, were obtained. A word recognition score was determined for each graded passage by recording reader miscues including substitutions, reversals, insertions, omissions, and unknown words provided by the examiner. Self-corrections, miscues on proper names, and dialectal pronunciations were recorded but not included in the total miscue count in accordance with test scoring instructions. (See Appendix C for criteria delineating dialectal variations.)

The MIDRI-R allowed for three levels of reading proficiency to be established for word recognition. An independent, instructional, and frustration level was determined according to the criteria shown in Table 3-2.

Table 3-2

Reading Proficiency Levels

| Level | Word Recognition |
|---|---|
| Independent | 98-100% |
| Instructional | 95-97% |
| Frustration | 0-94% |

However, not all subjects attained a RGL score for the independent or instructional level. The instructional RGL was absent if, for example, a subject read the grade two

passage at an independent level and grade three at the frustration level. The independent RGL was missing if a subject was unable to read the primer passage with 98% accuracy. In the event that an instructional RGL was not obtained, the independent and frustration RGLs were averaged for analysis procedures. For subjects who performed at frustration on the primer passage (equivalent to a 1.5 RGL), a 1.0 RGL was recorded.

Comprehension was assessed through readers' responses to the eight questions following each passage. Two questions involved recall, two required interpretation of the text, and four measured critical thinking skills such as evaluating the truth or sense of the passage, or judging the mood of the passage.

Finally, a reading rate was obtained for each subject. The highest instructional level passage read by each subject was timed and the rate converted to a words per minute (wpm) score.

Calculating the ZPD

The reading passages of the MIDRI-R were used to establish the lower and upper limits of each CRS subject's range of reading ability, or ZPD. Two testing periods were required to calculate the ZPD. The lower limit (i.e., unscaffolded level) was obtained by having the subject read the grade level passages without assistance. The upper limit (i.e., scaffolded level) was obtained according to the following procedure:

1. The subject's lowest MIDRI-R grade-level passage scored at the frustration level was identified. This was the level at which scaffolding was initiated.
2. Scaffolding was provided during the reading of this passage. Examples of scaffolding strategies that the researcher used to support the reader included: providing preparatory sets that served to activate background knowledge relevant to the text that was about to be read; parsing complex language structures into smaller units; providing feedback to clarify, expand, or extend information; and paraphrasing information read.
3. Following scaffolding, the subject reread the passage aloud. This reading was scored according to MIDRI-R instructions to determine the scaffolded reading level (i.e., either independent, instructional, or frustration).
4. Scaffolding and rereading of the passages continued at progressively more difficult grade levels until the subject scored at the frustration level even under scaffolding conditions.
5. The highest instructional level (or the average of the independent and frustration level in the absence of an instructional level) obtained

through this procedure served as the scaffolded instructional reading level in pretest-posttest measures.

6. If neither an independent nor instructional level was obtained during scaffolding, the highest unscaffolded instructional level passage served as the measure for pretest-posttest comparisons.

Probes

Five probes were obtained from CRS subjects to measure patterns of change occurring during the course of intervention. The initial (i.e., baseline) probe was conducted within the first week of intervention. The remaining four probes were completed after approximately every 10 hours of reading instruction. All probe measures were collected during individual sessions. The probe passages were randomly selected from a collection of commercially-prepared graded readings, but all subjects at the same level received the same probe, in the same order to allow for cross-subject comparisons.

The following steps were implemented during each probe session. First, the subject read the passage aloud while the examiner recorded miscues. Next, the subject answered the comprehension questions as the examiner read them aloud. The examiner read the questions to ensure that comprehension of the story was being measured rather than the subject's ability to read the questions. However, a copy of the questions also was provided for the

subject to read during the questioning. Finally, the examiner asked the subject to retell the passage as if telling it to a naive listener. During retelling, only neutral prompts such as "Can you tell me more?" were used. Prior to beginning the probe, subjects were reminded that the examiner could not provide any assistance with unknown words. Furthermore, no scaffolding was provided during probe sessions, and subjects were not allowed to look back at the text during the questioning or retelling phases.

Probe passages began at each subject's scaffolded instructional reading level. To remain within the instructional level of difficulty, the readability level of the probe passages was increased as independent reading ability improved. Thus, the reading level of a subject's probe increased by one grade level when the subject:

1. Scored at or above 60% on the comprehension questions,

and

2. Miscued on fewer than 10% of the total number of words in the passage (40 or fewer miscues),

or

3. Read the passage in 4 minutes or less.

This criterion was implemented to ensure that the passages continued to challenge the subjects throughout the course of intervention (i.e., remained at a level of difficulty that reflected a scaffolded instructional reading level).

## Intervention

Reading intervention was provided for both CRS and control subjects. Different instructional conditions were in place for each group, but the total number of instructional hours was similar.

### Communicative Reading Strategies

Intervention was provided to CRS subjects in two small groups. Subjects were assigned to the groups based on their RGLs and class schedules at the learning center. Reading sessions were 1 hour and 15 minutes in length. Subjects received a total of 40 hours of reading instruction. Due to absences or tardiness, the length of time needed to complete the 40 instructional hours varied across subjects, ranging from 11 to 21 weeks. Instruction was provided by the researcher who is a certified speech-language pathologist with over eight years of experience providing language and reading intervention.

It should be noted that during the course of the study, Project Independence required CRS subjects to continue their participation in the center's math, language, and writing classes. Although reading instruction was suspended for all CRS subjects, study of vocabulary specific to preparing for periodic progress testing did occur.

Communicative Reading Strategies (CRS) (Norris, 1988, 1989; Norris & Hoffman, 1993) served as the reading approach for the CRS group. Within the CRS approach,

reading was treated as an interactive, ongoing communication between the author and the reader via the printed words. The instructor served as a facilitator to assist the reader in constructing meaning from the text and to repair communication breakdowns. To this end, a variety of scaffolding strategies were employed.

CRS involved three general procedures (Norris, 1989). In the first step, the facilitator provided a preparatory set for the reader. A preparatory set served to activate relevant background knowledge, establish the intent of a passage, or simplify a unit of text for the reader. The second procedure occurred after a preparatory set was given. In this step, the reader was given an opportunity to communicate the information in the text by reading the words. The facilitator monitored the reading to determine whether the information was meaningfully processed.

Feedback, the third basic procedure, was then provided based on how the subject read the text. If the text was read fluently, the facilitator either expanded on the idea, linked related ideas together, or generalized the concepts to similar situations. If the text was not read fluently, the facilitator assisted the reader to reinterpret the text. To aid the reader, the facilitator divided complex sentences into smaller idea units, provided semantic cues, or paraphrased text. Specific strategies used in conducting CRS are described in Appendix A.

Skill-Based Instruction

Individualized, skill-based instruction was provided to control subjects. Subjects received an average of 53 hours (range = 40 to 64 hours) of reading instruction during the course of the study. Specific skills to be learned were selected by on-site personnel based on the subjects' identified needs and reading level. Subjects progressed through workbook and computer programs at their own rate. Instruction was provided by a certified teacher with 5 years of experience working with adult learners at that center.

## Materials

### Probe Stimuli

Narrative passages from the Timed Readings in Literature series (Spargo, 1989) were utilized for probes conducted during intervention. The series consisted of 10 books, one book for each grade level fourth through college. Each book contained fifty, 400-word excerpts of classical literature, such as The Adventures of Huckleberry Finn. Ten multiple-choice comprehension questions followed each passage. The first five questions required factual recall, while the remaining questions required interpretation of the text. Four subjects required probes below the fourth grade level (i.e., third grade level); therefore, additional reading passages and questions were developed. Like the Timed Readings in Literature, the reading level for these passages was

established using the Fry readability formula (Fry, 1977). Comprehension questions were developed to parallel the types of questions presented in the series.

CRS Stimuli

Narrative text served as stimuli for the CRS treatment condition. Each of the instructional narratives was characterized by events related through temporal and causal relations. The narrative elements necessary for a complete story were present in each selection including a setting, characters, an initiating event that caused a problem, a plan to solve the problem, attempts to resolve the problem, and the consequences resulting from the attempts (Stein & Glenn, 1979). These elements were combined to create episodes. Narratives either were simple in that only one episode was present, or were comprised of multiple, embedded episodes.

The scaffolded instructional reading level obtained during pretesting served as a guide in determining the readability level of the stories used at the beginning of intervention. As there were different scaffolded levels among group members, the highest instructional level obtained without being at any subject's frustration level was utilized. Successive books were selected to correspond to the scaffolded instructional reading level of the group based on scores obtained on the probes. Some variation in the readability level of the intervention stories occurred depending on the background knowledge of

the group. For example, stories with highly familiar themes often were at a readability level that exceeded the scaffolded instructional level of the group.

### Skill-Based Stimuli

A variety of workbook series and computerized software programs (e.g., Vocabulary Connections, Reading Skills, Words in Context, Learning 100, Basic Skills Software) served as instructional material for the control condition. The content and organization of the material was similar regardless of the medium of presentation. Instructional material targeted reading subskills such as developing vocabulary (e.g., exercises on synonyms, antonyms, homographs, prefixes), using context cues, predicting outcomes, determining cause and effect, identifying the mood or tone of a passage, distinguishing between fact and opinion, identifying main ideas and details, and sequencing. Instructional material was structured such that the student was required to read a sentence or short passage and respond to cloze, fill-in-the-blank, matching, or multiple-choice questions.

## Measurements

Pretest and posttest reading measures were analyzed to determine whether CRS intervention positively influenced the reading performance of adults with low reading skills. Data were analyzed to determine whether intervention was effective in (a) increasing the reading performance of adult low-ability readers, and (b)

increasing the adult low-ability reader's ZPD. The dependent variables for group comparison of reading performance included measures of (a) RGL scores, (b) comprehension, and (c) rate. For CRS subjects, the dependent variables for measuring changes in ZPD were scaffolded and unscaffolded RGL and comprehension scores. In addition, intermittent probes provided a measure of the effects of CRS on reading behavior across time. Dependent variables included measures of reading accuracy, fluency, self-correcting behavior, rate, comprehension of story questions, and retelling ability.

Oral Reading Measures

A reading miscue analysis was conducted on all probe oral reading samples. Miscues were coded onto written transcripts of the story from audio recordings of the reading samples. All miscues were designated as either accuracy- or fluency-related miscues. Accuracy-related miscues included (a) substitutions, (b) insertions, (c) omissions, (d) reversals, and (e) self-corrections. Fluency-related miscues included (a) repetitions, (b) pauses, (c) phrasing errors, and (d) intonational shifts. (See Appendix D for operational criteria and coding symbols.) Miscues on proper nouns were coded for each occurrence but only counted once in the miscue total. Multiple repetitions of the same word(s) were coded for each occurrence but only counted as one miscue. Multiple

miscues on a single word were coded for each occurrence, but only the last miscue was counted in the total.

A ratio of the number of miscued words (i.e., substitutions, insertions, omissions, and reversals) to the total number of words in the passage was used to measure reading accuracy. Fluency was measured by calculating the percentage of fluency-related miscues per number of sentences for each passage. Reading rates were determined separately for the MIDRI-R and probe passages. A timed rate analysis was conducted on each reading sample from the audio recordings. A stopwatch was used to time each reading. The rate was converted into a wpm score. For the MIDRI-R, the wpm scores from the highest instructional RGL at pretest and that same grade level passage at posttest were utilized in group comparisons.

## Comprehension Measures

Two different tasks, answering questions and story retelling, were completed to provide measures of reading comprehension. All subjects answered MIDRI-R comprehension questions. Additionally, CRS subjects responded to probe questions and provided retellings of probe passages.

Story questions. Subjects' oral responses to story questions were analyzed and the total number of correct answers was calculated. For the MIDRI-R, a total comprehension score for each subject was obtained by tallying the number of correct responses from the

independent and instructional level passages. Questions on frustration level passages were not included in the total, however, all questions below the independent level (i.e., basal) were scored as correct and included in the total count. For probe questions, a comprehension score for each probe was obtained by tallying the number of correct responses and converting the number to a percentage score.

Story Retelling. The second measure of comprehension was derived from the story retellings. Retellings from probe passages were analyzed for changes in completeness, organization, accuracy, fluency, and clarity. Retellings were transcribed verbatim. Nonfluencies, asides, and false starts produced by the subjects, and prompts from the examiner were included in the transcriptions.

The retellings were parsed into T-units. Hunt (1977) defined a T-unit as one main clause plus its associated dependent clauses. For this study, the T-units were modified so that all clauses subordinate to the immediately preceding main clause were included in the same T-unit. The following rules were utilized to determine when to parse connected utterances into separate T-units.

1. A T-unit had one or more subordinate clauses attached to or embedded within it.
2. Compound sentences composed of two or more complete sentences were counted as a single

T-unit if the ideas maintained a subordinate relationship. Utterances connected by so or and that demonstrated a subordinate relationship were not divided (e.g., "He wanted to show his mom so he just ran away." "He saw the man who had come outside on the porch with a shotgun and he thought he was going to shoot.").

3. Compound sentences were counted as separate T-units if the ideas maintained a coordinate relationship. Utterances connected by and were divided when the phrases could stand alone (e.g., "Jamie jumped the fence. And he looked back to see his friend."). When then was used in a temporal sense, the utterance was divided (e.g., "He told him to go. Then he saw the man in his house.").
4. When a maze (any filler, repetition, or reformulation) occurred within an utterance, the elements that were critical to the proposition were considered part of the T-unit.
5. Utterances unrelated to the story content (e.g., "It was kind of hard." "I didn't really understand what I read.") were parsed into T-units, but excluded from the total T-unit count.
6. Abandoned utterances were excluded from the total T-unit count.

T-units were coded to calculate a measure of the accuracy, fluency, and clarity of each retelling. Each T-unit was entered on a separate line and coded using procedures specified by the Systematic Analysis of Language Transcripts (SALT) program for personal computers (Miller & Chapman, 1993). The program calculated the number of T-units, linguistic mazes, and occurrences of other premarked codes. (See Appendix E for code definitions and symbols.)

T-units were utilized to determine the accuracy, fluency, and clarity of the samples. Retelling accuracy was the ratio of the number of T-units marked with a message error to the total number of T-units. A ratio of the number of T-units containing fluency errors (i.e., mazes and pauses) to the total number of T-units was used to measure fluency. T-units that contained a single, minor dysfluency (e.g., uh, uhm, okay) were not counted as dysfluent. Finally, clarity was determined by calculating the ratio of T-units containing a word choice or word order error to the total number of T-units related to the story.

Story completeness was measured by analyzing oral retellings for the presence of story elements. To determine completeness, the written probe passages first were segmented into episodes according to Stein and Glenn's (1979) description. For this study, an episode consisted of four story elements (a) setting (i.e.,

characters), (b) initiating event (i.e., problem), (c) attempt to solve the problem, and (d) consequence of the attempt. Next, transcripts of the retellings were compared to the original passage. Story completeness was determined by counting the number of story elements present in each retelling sample as compared to the written text.

Organization was evaluated through a comparison of the retelling sample to the original text. The structure of the retelling was compared to the written text to identify differences in level of organization.

## Reliability

Reliability was completed for measures of oral reading, comprehension, and intervention procedures. The primary researcher transcribed and coded all reading samples and story retellings. A graduate student in communication disorders served as the second rater to establish reliability for oral reading and comprehension (i.e., MIDRI-R questions) measures. The graduate student had one semester of experience in utilizing the miscue coding system prior to conducting reliability coding. A certified speech-language pathologist with an earned Ph.D., who was familiar with using SALT procedures and coding narratives, completed reliability for story retelling measures. Training for all reliability procedures continued until 90% point-by-point agreement (number of agreements divided by the number of agreements

plus disagreements multiplied by 100) was achieved. At that point, actual coding began. Retraining in the coding procedures was initiated if 85% or greater agreement was not met. Procedures specific to each type of measure are detailed below.

## Oral Reading

The reliability of oral reading measures was established separately for MIDRI-R and probe samples. Fifteen percent of the MIDRI-R passages and 20% of the probe samples were randomly selected and independently coded by the primary researcher and second rater. Prior to this procedure, the second rater underwent training with the primary researcher. Training involved a review of the miscue categories including the definition of each miscue, symbols for marking miscues, and examples of miscues. For the MIDRI-R passages, the total number of accuracy miscues (i.e., substitutions, insertions, omissions, and reversals) determined the RGL for each passage. Therefore, point-by-point agreement of the RGL was utilized to determined reliability rather than the actual number of accuracy errors. For rate reliability, a differential of one second between coders was allowed to account for human error. An overall agreement of 92% was obtained for the combined oral reading measures. Interrater agreements for the individual oral reading dependent variables were as follows:

| | % Agreement |
|---|---|
| MIDRI-R | |
| Accuracy (RGL) | 92% |
| Rate | 91% |
| Probes | |
| Accuracy | 90% |
| Fluency | 86% |
| Self-correction | 94% |
| Rate | 100% |

## Comprehension

### Questions

To determine reliability of scoring the MIDRI-R comprehension questions, fifteen percent of the questions were randomly selected and independently analyzed by a second rater. Prior to this procedure, scoring procedures were reviewed, and examples of correct and incorrect responses to questions at all grade levels were provided. Interrater agreement for comprehension reliability was 94%. Because the probes consisted entirely of objective questions, reliability was not conducted for that measure.

### Story Retelling

Several steps were involved in establishing reliability for story retelling measures. Reliability was established for (a) segmenting probe passages into story elements, (b) transcribing oral retelling samples, (c) segmenting utterances into T-units, and (d) calculating total retelling scores. Training consisted of providing

the second rater with definitions and examples of each measure, followed by practice and feedback until 85% agreement was reached for each measure. At that point, actual coding began. Twenty percent of the probe stories and retelling samples were randomly selected and independently analyzed by a second rater to establish reliability. Interrater agreements for retelling related measures were as follows:

| | % Agreement |
|---|---|
| Story elements | 94% |
| Retelling transcriptions | 90% |
| T-units | 87% |
| Retelling scores | 88% |

An overall agreement of 90% was obtained for the combined retelling-related measures.

Intervention Procedures

To establish reliability of the CRS intervention procedures used in the study, two certified speech-language pathologists with an earned Ph.D. independently viewed 3 randomly selected video recordings of the reading sessions. During the viewing of the prepared video, each reviewer completed a procedural checklist (see Appendix F). The scores of the two ratings were compared for point-by-point agreement of responses. The total number of agreements was divided by the total number of agreements plus disagreements and multiplied by 100. Interrater agreement was 80% for intervention procedure

reliability. Three of the 15 techniques evaluated accounted for the disagreement between raters.

## Data Analysis

The data obtained on the dependent variables were subjected to the following analyses. Measurements of RGL, comprehension, and reading rate were obtained at pretest and posttest. The differences between gain scores for CRS and control groups on these measures were compared. Mann-Whitney U tests were employed to determine whether the differences between gain scores for the two groups reached levels of significance. The Mann-Whitney U was selected because it is an appropriate statistical test for evaluating treatment differences on data drawn from two independent samples when the sample size is small.

To examine changes in word recognition and comprehension under unscaffolded and scaffolded conditions, individual gains and group means were reported for each variable. The relationship between gains at pretest under scaffolded conditions and actual gains at posttest was then determined for word recognition and comprehension using the Pearson correlation. Finally, descriptive statistics were used to analyze patterns of change in the reading behavior of CRS subjects across time.

# RESULTS

The present study was undertaken to determine the efficacy of Communicative Reading Strategies (CRS) as an instructional strategy for adults reading at or below a fifth grade level. Specifically, the study addressed three research questions. (a) Will adult low-ability readers receiving CRS instruction demonstrate significant improvement in reading ability compared to a control condition? (b) Will CRS instruction result in an increase in the range of reading ability, or ZPD, for adult low-ability readers? (c) Will adult low-ability readers demonstrate improved coordination of reading processes as a result of CRS instruction?

Measures of reading performance were obtained for CRS and control groups at pretest and posttest. Intermittent probes, conducted throughout the duration of the study, provided ongoing measures of reading proficiency for CRS subjects. Data were analyzed for group and individual subject changes. Group comparisons will be reported first, followed by analyses of within subject changes in reading performance.

## Comparison of CRS and Control Groups

Question one examined the effects of CRS instruction compared to skill-based instruction on reading ability. Three measures of reading were compared, representing different elements of oral reading derived from the

administration of the McCarthy Individualized Diagnostic Reading Inventory-revised edition (MIDRI-R) (McCarthy, 1976). Word recognition was the percentage of words accurately identified in a contextualized reading passage. The highest graded reading passage that a subject scored at the instructional level was used to measure pretest and posttest gains. Comprehension was measured as the total number of comprehension questions answered correctly from the first passage through the instructional level attained at each testing. Therefore, for each graded reading level of improvement at posttest, eight additional comprehension questions were asked, and the score reflected the increased ability to answer harder questions about more difficult passages. Rate was the number of words read per minute. The rate of reading the instructional passage at pretest was compared to the rate of reading that same passage at posttest to assess gains in speed of reading.

The instructional word recognition level, number of comprehension questions correctly answered, and reading rate of the pretest instructional reading level passage are profiled for CRS and control group subjects in Table 4-1. Both individual performance and group means are shown. Gain scores (increases or decreases) are also reported for each subject and for the group mean, representing the amount of change between pretest and posttest for each measure. Examination of this table

Table 4-1

Pretest and Posttest Comparison of CRS and Control Groups for Word Recognition, Comprehension, and Rate

CRS Group

| | Word Recognition | | | Comprehension | | | Reading Rate | | |
|---|---|---|---|---|---|---|---|---|---|
| Subject | Pre | Post | Gain | Pre | Post | Gain | Pre | Post | Gain |
| 1 | 3.5 | 5.5 | +2.0 | 31 | 47 | +16 | 98 | 96 | - 2 |
| 2 | 3.0 | 6.0 | +3.0 | 29 | 50 | +21 | 103 | 114 | +10 |
| 3 | 3.0 | 3.0 | +0.0 | 30 | 30 | + 0 | 68 | 86 | +18 |
| 4 | 3.0 | 3.0 | +0.0 | 29 | 28 | - 1 | 90 | 81 | - 9 |
| 5 | 2.5 | 4.0 | +1.5 | 24 | 39 | +15 | 76 | 70 | - 6 |
| 6 | 2.0 | 3.0 | +1.0 | 14 | 13 | - 1 | 127 | 136 | + 9 |
| M = | 2.8 | 4.1 | +1.3 | 26 | 35 | +8.3 | 94 | 97 | +3.3 |

Control Group

| | Word Recognition | | | Comprehension | | | Reading Rate | | |
|---|---|---|---|---|---|---|---|---|---|
| Subject | Pre | Post | Gain | Pre | Post | Gain | Pre | Post | Gain |
| 1 | 5.0 | 5.0 | +0.0 | 40 | 44 | + 4 | 144 | 159 | +15 |
| 2 | 4.0 | 5.0 | +1.0 | 38 | 42 | + 4 | 120 | 122 | + 2 |
| 3 | 2.0 | 2.0 | +0.0 | 13 | 15 | + 2 | 82 | 110 | +28 |
| 4 | 5.5 | 7.0 | +1.5 | 48 | 55 | + 7 | 143 | 167 | +24 |
| 5 | 3.0 | 1.8 | -1.2 | 12 | 8 | - 4 | 94 | 93 | - 1 |
| 6 | 5.5 | 7.0 | +1.5 | 33 | 51 | +18 | 151 | 143 | - 8 |
| M = | 4.2 | 4.6 | +.47 | 31 | 36 | +5.2 | 122 | 132 | +10 |

Note. CRS = Communicative Reading Strategies; Pre = Pretest; Post = Posttest; Gain = Gain score.

recognition gains showed that four of the six CRS subjects revealed differences between the groups for all three measures. Comparison of word made at least one grade level increase in instructional reading level ($\underline{M}$ = 1.3 RGL), whereas three of the control subjects showed an increase and one exhibited a decrease in the instructional level, resulting in a mean of approximately one half of a grade level increase ($\underline{M}$ = .47 RGL).

Comparison of comprehension gains revealed that three of the CRS subjects increased comprehension approximately two grade levels (with 8 points possible at each grade), whereas three showed no changes in grade level of comprehension (answering one fewer or the same number of questions at posttest). The resulting mean gain in comprehension for this group was one grade level, or 8.3 points. Only one subject in the control group made gains equivalent to two grade levels, one subject gained nearly one grade, and three gained one half of a grade level or less. One subject decreased the number of questions correctly responded to by four points. The average gain for this group was less than one grade level, or 5.2 points.

Comparison of reading rate revealed that three of the CRS subjects showed an increase in the number of words read per minute, and three showed decreases. None of these gains were large and reading rate for all subjects remained slow, well below the average reading rate of 200

words per minute for adult reading. The mean gain in reading rate was 3.3 wpm. The control subjects demonstrated faster reading rates at pretest ($\underline{M}_{CRS}$ = 94 wpm; $\underline{M}_{Con}$ = 127 wpm), with a mean gain at posttest of 10 wpm.

Mann-Whitney U analyses were used to examine differences between groups for each of the outcome measures. The analysis assessed the number of times that members of one group were ranked higher than the members of the comparison group. For this analysis all subjects (i.e., CRS and control) were pooled into a single group, and the gain scores of the 12 resulting subjects were rank ordered. When ties occurred (i.e., two or more subjects each made the same gain score), the average of their ranked positions served as the ranked score for each (i.e., all were awarded the same ranked number). The subjects then were reassigned to the CRS and control groups, and the mean rank was computed for each group. The results of the rank ordering, computed according to group for word recognition, comprehension, and reading rate is shown in Table 4-2.

When the CRS and control groups were compared for word recognition, no significant differences were found in the resulting $\underline{z}$-score (corrected for ties) [$\underline{z}$ = 1.07, $\underline{p}$ = .285]. This result suggests that subjects made comparable gains whether they received instruction in the CRS or the control condition. The higher mean gain scores in the CRS

Table 4-2

Gain Scores and Ranks of Reading Grade Level, Comprehension, and Reading Rate Attained from the MIDRI-R for CRS and Control Subjects

| CRS | | Control | |
|---|---|---|---|
| Gain Score | Rank | Gain Score | Rank |
| **RGL[a]** | | | |
| 0.0 | 3.5 | -1.2 | 1 |
| 0.0 | 3.5 | 0.0 | 3.5 |
| 1.0 | 6.5 | 0.0 | 3.5 |
| 1.5 | 9 | 1.0 | 6.5 |
| 2.0 | 11 | 1.5 | 9 |
| 3.0 | 12 | 1.5 | 9 |
| | $R_1 = 45.5$ | | $R_2 = 32.5$ |
| | $n_1 = 6$ | | $n_2 = 6$ |
| **Comprehension[b]** | | | |
| - 1 | 2.5 | - 4 | 1 |
| - 1 | 2.5 | 2 | 5 |
| 0 | 4 | 4 | 6.5 |
| 15 | 9 | 4 | 6.5 |
| 16 | 10 | 7 | 8 |
| 21 | 12 | 18 | 11 |
| | $R_1 = 40$ | | $R_2 = 38$ |
| | $n_1 = 6$ | | $n_2 = 6$ |
| **Rate[c]** | | | |
| - 9 | 1 | - 8 | 2 |
| - 6 | 3 | - 1 | 5 |
| - 2 | 4 | 2 | 6 |
| 9 | 7 | 15 | 9 |
| 10 | 8 | 24 | 11 |
| 18 | 10 | 28 | 12 |
| | $R_1 = 33$ | | $R_2 = 45$ |
| | $n_1 = 6$ | | $n_2 = 6$ |

Note. MIDRI-R = McCarthy Individualized Diagnostic Reading Inventory-revised edition; R = Composite rank.
[a]Gain scores reflect changes by reading grade level. [b]Gains scores reflect changes in number of questions answered correctly. [c]Gain scores reflect changes in number of words read per minute.

condition were attributable to two subjects who made better gains than any of the control subjects, and not to an overall instructional advantage that held for all subjects.

When the CRS and control groups were compared for comprehension, no significant differences were found in the resulting *z*-score (corrected for ties) [$z = 0.16$, $p = .872$]. This finding suggests that subjects made comparable gains in their understanding of a passage read whether they received instruction in the CRS or the control condition. The higher mean comprehension scores in the CRS condition reflected large gains made by three subjects, and not an overall effect of improved comprehension across subjects.

When the CRS and control groups were compared for reading rate, no significant differences were found in the resulting *z*-score (corrected for ties) [$z = 0.55$, $p = .584$]. This result suggests that subjects made comparable gains in speed of reading whether they received instruction in the CRS or the control condition. The higher mean rate scores in the control condition reflected large gains made by three subjects, and not an overall effect of increased speed of reading across subjects.

## Summary

The results of the comparison of subjects receiving CRS instruction compared to a control condition of skill-based instruction revealed no significant effects in

increased word recognition, passage comprehension, or reading rate for either condition. Following 40 hours of instruction, both groups showed individuals who made no progress in reading recognition, comprehension, or rate. Both groups showed individuals who made a grade level or more of change in this short time period. Of the subjects who did make progress, the largest increases (i.e., two grade levels) in both word recognition and comprehension were in the CRS group. This finding suggests that CRS may have differential effects for adult readers who differ according to currently unidentified variables.

The performance of each subject in the CRS group was used to further examine patterns of reading under CRS conditions. First, the effects of CRS on frustration level reading were examined to assess changes in word recognition and comprehension that occurred when this assistance was provided. Secondly, the effects of CRS on reading was measured by analyzing passages at the same reading grade level following each 10-hour block of intervention. Comparisons were made between subjects who made limited progress versus those who made rapid changes.

### Effects of CRS on Frustration Level Reading

The reading performance of the CRS subjects on the MIDRI-R was further analyzed to examine the effects of assistive cues (i.e., CRS scaffolding) provided during reading on word recognition and passage comprehension. Performance between scaffolded and unscaffolded reading

was compared at pretest and again at posttest. Differences between scaffolded versus unscaffolded conditions were examined for those subjects who increased in reading levels following instruction compared to those who made minimal or no gains.

The instructional word recognition level and number of comprehension questions correctly answered under scaffolded conditions compared to unscaffolded conditions is profiled in Table 4-3. Both individual performance and group means are shown. The unscaffolded condition was the instructional reading level, and was the same score as that reported in Table 4-1. The scaffolded condition represented a rereading of the passage at the next highest level (i.e., the frustration level just attained under unscaffolded conditions), and any subsequent passages that could be read without frustration under assisted conditions. This level
was used as a measure of potential for change, or a readiness to read and comprehend the more difficult text.

Unscaffolded versus Scaffolded Word Recognition

Comparison of word recognition levels under unscaffolded and scaffolded conditions at pretest showed that all but one subject successfully read at a higher grade level using CRS. The mean gain in word recognition was 1.2 RGLs ($\underline{M}_{no}$ = 2.8; $\underline{M}_{yes}$ = 4.0), with individual gains ranging from no change to two grade levels of change. These findings show that, when provided scaffolding, adult

low-ability readers can experience measurably better word recognition immediately, with no intervening instruction on word recognition or word analysis skills.

These findings were replicated at posttest, as shown in Table 4-3. Four of the subjects read passages at a higher grade level using CRS scaffolding. The mean gain in word recognition was 1.1 RGL ($\underline{M}_{no}$ = 4.1; $\underline{M}_{yes}$ = 5.2), with individual gains ranging from no change to two grade levels of change. These findings show that as subjects progressed to a higher level of unassisted reading, their potential for reading more difficult passages increased correspondingly.

The immediate gain in instructional word recognition level under the CRS scaffolding condition at pretest was positively related to the actual gain in word recognition at posttest following 40 hours of CRS instruction. Table 4-3 shows that actual gains at posttest were within .5 grade level of the scaffolded prediction for four of the subjects, and at 1.0 and 1.5 grade levels for the remaining subjects. In all cases, higher gain scores at posttest were attained by subjects who made the greatest scaffolded gains at pretest. Similarly, the subject who demonstrated no change with scaffolding made no gains in word recognition at posttest.

The stability of the correlation between scaffolded reading level at pretest and unassisted reading level at posttest was assessed using the Pearson correlation. The

Table 4-3

Pretest and Posttest Comparison of CRS and Control Groups for Scaffolded and Unscaffolded Word Recognition and Comprehension

Word Recognition

| | Pretest Scores | | | | Posttest Scores | | |
|---|---|---|---|---|---|---|---|
| | Scaffolded | | | Posttest | Scaffolded | | |
| Subject | No | Yes | Gain | Gain | No | Yes | Gain |
| 1 | 3.5 | 5.0 | +1.5 | +2.0 | 5.5 | 7.0 | +1.5 |
| 2 | 3.0 | 4.5 | +1.5 | +3.0 | 6.0 | 6.0 | +0.0 |
| 3 | 3.0 | 4.0 | +1.0 | +0.0 | 3.0 | 5.0 | +2.0 |
| 4 | 3.0 | 3.0 | +0.0 | +0.0 | 3.0 | 3.0 | +0.0 |
| 5 | 2.5 | 4.5 | +2.0 | +1.5 | 4.0 | 5.0 | +1.0 |
| 6 | 2.0 | 3.0 | +1.0 | +1.0 | 3.0 | 5.0 | +2.0 |
| M = | 2.8 | 4.0 | +1.2 | +1.3 | 4.1 | 5.2 | +1.1 |

Comprehension

| | Pretest Scores | | | | Posttest Scores | | |
|---|---|---|---|---|---|---|---|
| | Scaffolded | | | Posttest | Scaffolded | | |
| Subject | No | Yes | Gain | Gain | No | Yes | Gain |
| 1 | 31 | 43 | +12 | +16 | 47 | 56 | + 9 |
| 2 | 29 | 36 | + 7 | +21 | 50 | 50 | + 0 |
| 3 | 30 | 36 | + 6 | + 0 | 30 | 43 | +13 |
| 4 | 29 | 29 | + 0 | - 1 | 28 | 28 | + 0 |
| 5 | 24 | 40 | +16 | +15 | 39 | 47 | + 8 |
| 6 | 14 | 17 | + 3 | - 1 | 13 | 22 | + 9 |
| M = | 26 | 34 | +7.3 | +8.3 | 35 | 41 | +6.5 |

Note. No = unassisted reading; Yes = scaffolded reading.

correlation is graphically depicted in Figure 4-1. This correlation ($r$ = .6866) suggests that the amount of change elicited under scaffolded reading conditions is predictive of the potential for change in unassisted reading level obtained following instruction.

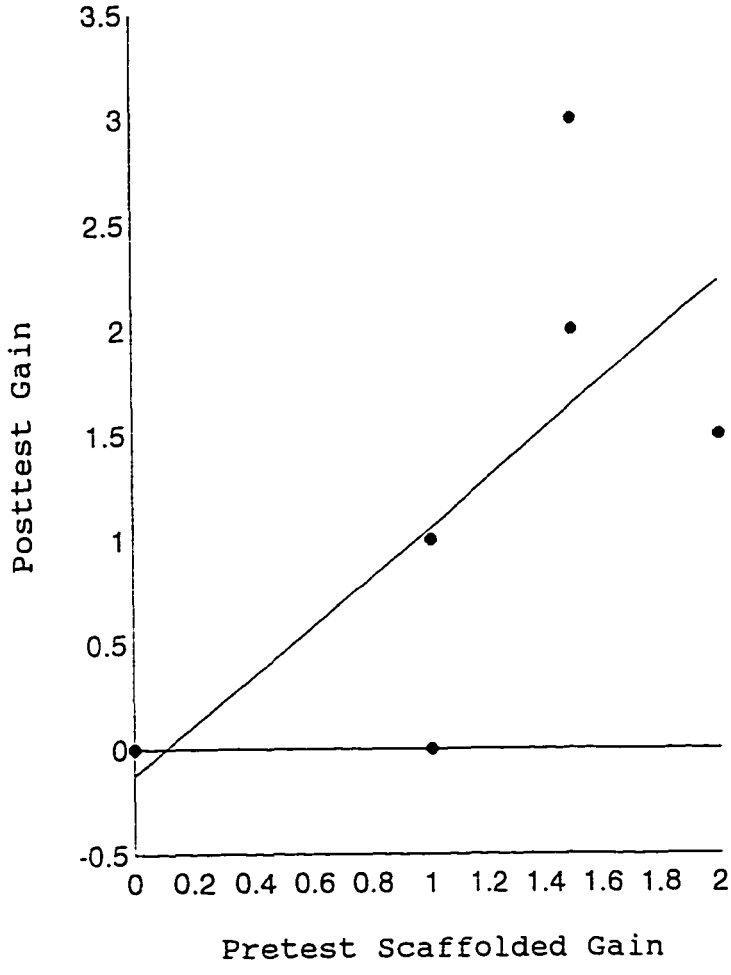


Figure 4-1. Correlation between scaffolded instructional reading grade level (RGL) gain scores at pretest and unassisted instructional reading grade level (RGL) gain scores at posttest for word recognition under Communicative Reading Strategies (CRS) condition.

Unscaffolded versus Scaffolded Comprehension

Comparison of comprehension levels under unscaffolded and scaffolded conditions at pretest showed that all but one subject correctly answered questions at a higher grade level under CRS scaffolding conditions. The mean gain in correct answers was 7.3 ($\underline{M}_{no}$ = 26; $\underline{M}_{yes}$ = 34), with individual gains ranging from no change to two grade levels of change. These findings show that adult low-ability readers can experience measurably better comprehension immediately with no intervening instruction on comprehension. In all but one case, those subjects who showed gains in comprehension under scaffolded conditions were the same as those showing increases in word recognition. These findings were replicated at posttest, as shown in Table 4-3. Four of the subjects comprehended passages at a higher grade level under CRS scaffolded conditions. The mean gain in correct answers was 6.5 ($\underline{M}_{no}$ = 35; $\underline{M}_{yes}$ = 41), with two subjects showing no change, and four subjects showing one or more grade levels of change. These findings show that as subjects progressed to a higher level of unassisted reading, the difficulty of the passages comprehended increased at a parallel rate when CRS scaffolding was provided.

The immediate gain in instructional comprehension under the CRS condition at pretest was positively related to the actual gain in comprehension at posttest following

40 hours of CRS instruction. Table 4-3 shows that actual gains at posttest were within one point of the scaffolded prediction for two of the subjects, at 4 and 6 points for three subjects, with only one subject showing a much greater gain than predicted (+7 compared to +21). In all but one case, higher gain scores at posttest were attained by subjects who made the greatest scaffolded gains at pretest. Similarly, the one subject who demonstrated no change with scaffolding made no gains in comprehension at posttest.

The stability of the correlation between scaffolded comprehension at pretest and unassisted comprehension at posttest was assessed using the Pearson correlation. The correlation ($r$ = .7362) is graphically depicted in Figure 4-2. This correlation suggests that the amount of change elicited under scaffolded reading conditions is predictive of the potential for change in unassisted reading level obtained following instruction.

Summary

The scaffolding provided by CRS interactions was effective in increasing both the assisted word recognition level and the assisted comprehension of adult readers. These results were obtained immediately, with no intervening instruction between identifying the instructional unassisted level and the instructional scaffolded level. The increases in gain scores were obtained during both pretest and posttest evaluations.

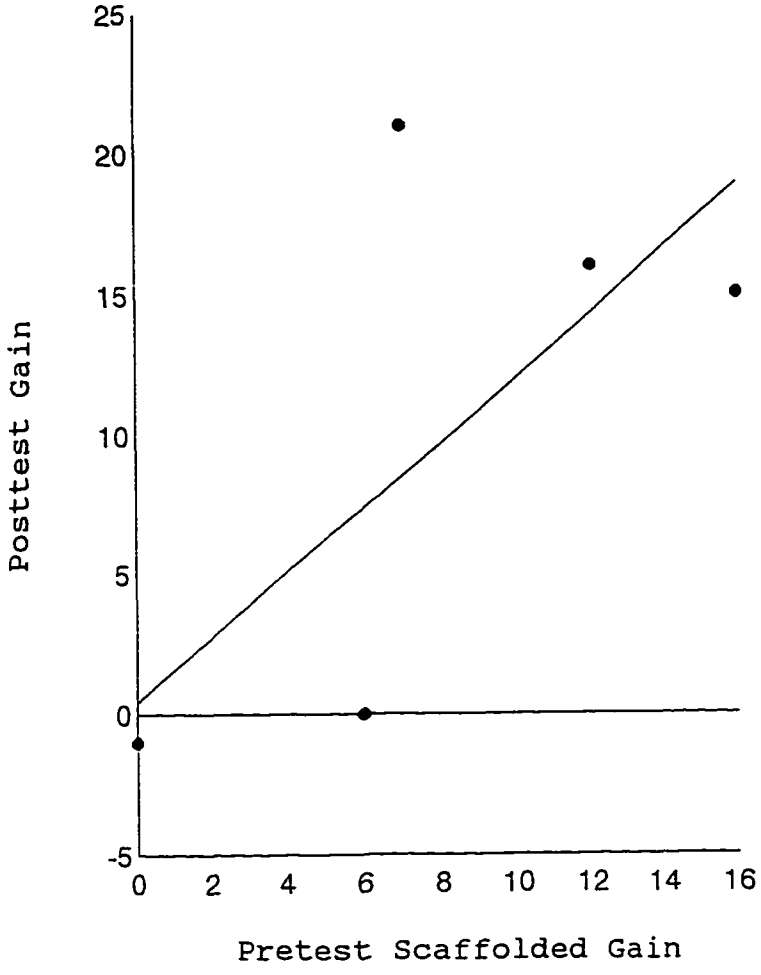


Figure 4-2. Correlation between scaffolded instructional comprehension gain scores at pretest and unassisted instructional comprehension gain scores at posttest under Communicative Reading Strategies (CRS) condition.

The amount of gain in both word recognition and comprehension obtained during the pretest was highly predictive of the amount of gain in unassisted reading exhibited at posttest following 40 hours of CRS instruction. This suggests that the scaffolded reading level may be a reliable indication of who may be expected to make immediate changes in reading achievement.

Effects of CRS on Reading Measured Across Time

Question three examined the effects of CRS on the ability of adult poor readers to coordinate the processes necessary for skillful reading. Difficulty coordinating reading processes was evidenced in word recognition errors, poor fluency and phrasing, and inadequate comprehension. It was predicted that because CRS focused on integrating word recognition and comprehension processes during reading instruction, evidence would be seen in better word recognition, faster rate, and higher comprehension across time as measured by probes administered before the first intervention session (i.e., baseline or probe 1), following each ten hours of CRS intervention, and at posttest (i.e., probe 5).

Probes were administered at a RGL equivalent to the subject's scaffolded instructional level. Performance on probes were analyzed and scored to reveal patterns of reading behavior. First, each subject's performance for (a) accuracy, or the percentage of words accurately read, (b) fluency of reading, comprised of appropriate phrasing and attention to punctuation, (c) percentage of self-corrections of errors, (d) the rate of word recognition, (e) correct responses to comprehension questions, and (f) evaluation of story retelling was determined for each of the 5 probes.

Next, for each reading measure, the probes were listed in descending order from the best to poorest

performance. For example, if a subject demonstrated the highest level of accuracy reading probe 2 and the lowest level of accuracy on probe 1, the number 2 was listed first in the accuracy column and the number 1 listed last. When all the probes had been ranked for each reading measure, the data were analyzed to reveal patterns of performance within and across subjects.

## Performance across Subjects

The rank order of each variable was compared across subjects by evaluating how many times changes occurred in the expected direction. It was expected that as subjects increased in reading ability from baseline through posttest, each 10-hour probe would reflect higher accuracy, speed, and comprehension. If this prediction held, then the lowest ranking should have occurred during the first (baseline) and second probe, and the highest ranking should have occurred for the fourth and fifth (posttest) probes. Table 4-4 shows the actual number of times (out of 30) that a ranking was obtained across subjects, converted to percentages.

Examination of the summary from the baseline and second probe showed that performance did not follow predictions. For most variables, only a small percentage of subjects obtained their worst ranking at baseline or following the second (i.e., first instructional) probe. For all six variables measuring word recognition, rate, and comprehension, only between 10%-17% of the first

Table 4-4

Summary of Changes in Reading Accuracy, Speed, and Comprehension Elicited at Baseline and Following Each Ten Hours of CRS Intervention

| | Word Recognition | | | | Speed | | Comprehension | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Accuracy | | Fluency | | SelfCorrect | | Rate | | Questions | Retell |
| | % | # | % | # | % | # | % | # | % # | % # |
| **Baseline and Second Probe** | | | | | | | | | | |
| Rank | | | | | | | | | | |
| High (Unexpected) | 7% | (2) | 10% | (3) | 13% | (4) | 10% | (3) | 23% (7) | 17% (5) |
| Low (Expected) | 10% | (3) | 17% | (5) | 10% | (3) | 17% | (5) | 10% (3) | 13% (4) |
| **Fourth and Posttest Probe** | | | | | | | | | | |
| Rank | | | | | | | | | | |
| High (Expected) | 17% | (5) | 27% | (8) | 27% | (8) | 27% | (8) | 23% (7) | 20% (6) |
| Low (Unexpected) | 10% | (3) | 10% | (3) | 10% | (3) | 10% | (3) | 10% (3) | 0% (0) |

Note. Terms enclosed in parentheses refer to predicted direction of results for probe scores.

readings elicited the lowest rankings, while a majority would have been expected to be in this range if the prediction held true. Similarly, 7%-10% of the best performances on word recognition, and 17%-23% on comprehension were elicited during the first probes

representing reading sampled before or shortly after intervention was introduced.

Examination of the summary from the fourth and fifth (i.e., posttest) probes also showed patterns that did not verify predictions. While some subjects did attain their highest scores during these probes, the percentage of final readings with the highest word recognition, rate, and comprehension scores only fell between 17%-27%. Furthermore, for measures such as accuracy, fluency, and rate, the best performances on the fourth and fifth probes were produced by the two subjects who showed no progress on the MIDRI-R. Consequently, the probes did not appear to reflect the changes in reading ability for either the high gain or no gain subjects.

Similarly, the poorest performance on word recognition, rate, and comprehension was obtained on the fourth and fifth probes for 10%-17% of the subjects. One of the subjects who made greatest gains on the MIDRI-R performed at the lowest level on either the fourth or fifth probe for five of the six variables.

## Summary

Group examination of word recognition, reading rate, and comprehension measured using five probes taken between baseline and posttest revealed unexpected results. While many subjects performed best on word recognition, reading rate, and comprehension during the fourth probe and posttest, as predicted, this number was only 27% or less.

For many subjects, their best performance was elicited at baseline or during the first instructional probe. Furthermore, there was no correspondence between performance on probes and gain scores on the MIDRI-R. Those subjects who showed no gain on the MIDRI-R demonstrated better performance on the fourth and posttest probes, while those who showed the greatest gains demonstrated their poorest performance for many measures at posttest.

To further examine the information obtained from the probes for patterns of change that occurred over the course of intervention, the profiles of each subject were examined and are discussed below.

Performance of Individual Subjects

The performance of individual subjects was examined for changes in patterns of reading between baseline and posttest by comparing the rank order for the six reading measures. For each subject, two tables are provided. The first designates the score for each measure for each probe (converted to percentages when appropriate). The second provides the rank ordering of each measure, arranged from highest (the probe in which the best performance was obtained) to lowest (the probe in which the poorest performance was obtained).

The score for word recognition, rate, and comprehension was considered relative to general guidelines, as summarized in Table 4-5. In general, word

Table 4-5

Guidelines for Interpreting Word Recognition, Comprehension, and Reading Rate Scores

| | Independent | | | Instructional | | | | Frustration | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Word Recognition | 100 | 99 | 98 | 97 | 96 | 95 | 94 | 93 | 92 | 91 | 90< | |
| Comprehension | 100 | 95 | 90 | 85 | 80 | 75 | 70 | 65 | 60 | 55 | 50< | |

| | Fast | Average | Slow |
|---|---|---|---|
| Rate | 300 | 200 | 80 70< |

recognition at 99% to 100% accuracy was independent, near or at 95% was instructional, and 90% accuracy or less was frustration. Comprehension was independent at 90% correct response and above, instructional at or near 75%, and frustration when comprehension was at 55% accuracy or less. Reading rate is fast at 300 wpm, average at approximately 200 wpm, and slow at or below 70 wpm.

Subject 1

Subject 1 was administered probes at a RGL of 5 which was equivalent to her instructional scaffolded grade level. By posttest, a RGL of 5.5 was attained on the MIDRI-R, indicating that the probes should have become easier to read across time as instructional reading level increased. The final probe (see Table 4-6 and 4-7) did reflect instructional word recognition (94%), independent comprehension (100%) but slow reading rate, suggesting

Table 4-6

Percentage of Correct Responses and Actual Number of Errors Computed for Measures of Word Recognition, Reading Speed, and Comprehension for Five Probes (RGL 5) by Subject 1

| | | Word Recognition | | | | Speed | | Comprehension | |
|---|---|---|---|---|---|---|---|---|---|
| | | Accuracy | Fluency | SelfCorrect | | Rate | | Question | Retell |
| Probe | | % # | % # | % # | | WPM | | % # | Points[a] |
| 1 | F | 91%(35) | 43%(16) | 43%(15) | | 80 | I | 90%(09) | 08 |
| 2 | S | 95%(20) | 09%(21) | 55%(11) | | 91 | S | 80%(08) | 11 |
| 3 | F | 92%(33) | 45%(16) | 33%(11) | | 83 | S | 80%(08) | 10 |
| 4 | F | 90%(41) | 50%(16) | 27%(11) | | 76 | F | 60%(06) | 10 |
| 5 | S | 94%(25) | 07%(25) | 60%(15) | | 73 | I | 100%(10) | 12 |

Note. RGL = reading grade level; WPM = words per minute; I = independent; S = instructional; F = frustration.
[a]Maximum score = 20.

Table 4-7

Rank Ordering of Five Probes by Performance on Six Measures of Word Recognition, Reading Speed, and Comprehension for Subject 1

| | Word Recognition | | | Speed | Comprehension | |
|---|---|---|---|---|---|---|
| | Accuracy | Fluency | SelfCorrect | WPM | Question | Retell |
| Rank | Probe# | Probe# | Probe# | Probe# | Probe# | Probe# |
| Highest | 2 | 4 | 5 | 2 | 5 | 5 |
| | 5 | 3 | 2 | 3 | 1 | 2 |
| | 3 | 1 | 1 | 1 | 2,3 | 3,4 |
| | 1 | 2 | 3 | 4 | 4 | 1 |
| Lowest | 4 | 5 | 4 | 5 | | |

that this level of accuracy in word recognition and comprehension was attainable but required considerable effort. The high level of accuracy was achieved by a high rate of self-correction of errors (60%), resulting in poor fluency of reading (7%) and slowed rate. The highest retelling also was attained for this final probe. A notably similar profile was obtained on the second probe, following the first 10 hours of intervention.

The third and fourth probes revealed a profile of greater fluency (i.e., attention to punctuation, phrasing, and intonation) but with only half as many self-corrections, resulting in word recognition scores at the frustration level (90%). Comprehension also was lowest for these two probes, and reading rate remained slow. Overall, Subject 1 exhibited a profile of difficulty coordinating processes to achieve both fluency and comprehension in the first probe, with word recognition weaker than comprehension. By the fifth probe, both word recognition and comprehension were better coordinated, but at the expense of rate and fluency.

Subject 2

Subject 2 was administered probes at a RGL of 4, and by posttest had attained, on the MIDRI-R, an independent status at 4, and an instructional level at RGLs 5 and 6. As shown in Tables 4-8 and 4-9, the probes reflected better comprehension across time, with initial response to

Table 4-8

Percentage of Correct Responses and Actual Number of Errors Computed for Measures of Word Recognition, Reading Speed, and Comprehension for Five Probes (RGL 4) by Subject 2

| | Word Recognition | | | | Speed | Comprehension | | |
|---|---|---|---|---|---|---|---|---|
| Probe | Accuracy | | Fluency | | SelfCorrect | | Rate | Question | | Retell |
| | % | # | % | # | % | # | WPM | % | # | Points[a] |
| 1 | F 91% | (35) | 35% | (26) | 26% | (09) | 83 | F 40% | (04) | 10 |
| 2 | F 88% | (48) | 49% | (18) | 19% | (09) | 96 | S 70% | (07) | 14 |
| 3 | F 92% | (33) | 55% | (14) | 27% | (09) | 84 | I 90% | (09) | 16 |
| 4 | F 89% | (44) | 31% | (22) | 41% | (18) | 84 | F 50% | (05) | 10 |
| 5 | F 89% | (45) | 11% | (25) | 40% | (18) | 62 | I 90% | (09) | 10 |

Note. RGL = reading grade level; WPM = words per minute; I = independent; S = instructional; F = frustration.
[a]Maximum score = 20.

Table 4-9

Rank Ordering of Five Probes by Performance on Six Measures of Word Recognition, Reading Speed, and Comprehension for Subject 2

| | Word Recognition | | | Speed | Comprehension | |
|---|---|---|---|---|---|---|
| | Accuracy | Fluency | SelfCorrect | WPM | Question | Retell |
| Rank | Probe# | Probe# | Probe# | Probe# | Probe# | Probe# |
| Highest | 3 | 3 | 4 | 2 | 5,3 | 3 |
| | 1 | 2 | 5 | 3,4 | 2 | 2 |
| | 4,5 | 1 | 3 | 1 | 4 | 1,4,5 |
| | 2 | 4 | 1 | 5 | 1 | |
| Lowest | | 5 | 2 | | | |

questions very poor (40%) and then increasing with each probe to 90% comprehension (with the exception of the fourth probe). Word recognition did not change across time, remaining at the frustration level throughout, with little variation in percent of accuracy (88%-92%). However, the rate of self-corrections was nearly twice as great for the fourth and fifth probes, indicating that Subject 2 was beginning to recognize and repair miscues as they occurred. The resulting pauses and revisions in phrasing was reflected in the poor fluency and slow rate attained for these final probes.

Subject 3

Subject 3 was administered probes at a RGL of 3 which was equivalent to her unscaffolded instructional grade level at pretest. At posttest, no gain was evidenced on the MIDRI-R for the unscaffolded instructional grade level (RGL = 3). The probes reflected the overall lack of improvement in word recognition as accuracy remained at frustration throughout the study (see Tables 4-10 and 4-11). However, the subject's performance on the fourth and fifth probes resulted in the highest level of accuracy (88%) and self-correction of errors, suggesting that the subject was beginning to recognize and repair miscues as they occurred. Fluency scores for probes 4 and 5 were also high, indicating an ability to coordinate accuracy and fluency. Reading rate for all probes was very slow, although a 20 wpm increase was attained from probe 1 to 5.

Table 4-10

Percentage of Correct Responses and Actual Number of Errors Computed for Measures of Word Recognition, Reading Speed, and Comprehension for Five Probes (RGL 3) by Subject 3

| | Word Recognition | | | | | Speed | Comprehension | | |
|---|---|---|---|---|---|---|---|---|---|
| | Accuracy | | Fluency | | SelfCorrect | | | Question | Retell |
| Probe | % | # | % | # | % | # | Rate | % | # | Points[a] |
| | | | | | | | WPM | | | |
| 1 | F 83% | (68) | 48% | (27) | 22% | (15) | 57 | F 60% | (06) | 09 |
| 2 | F 82% | (73) | 61% | (16) | 18% | (13) | 73 | I 90% | (09) | 16 |
| 3 | F 76% | (95) | 50% | (24) | 22% | (21) | 63 | S 67% | (06) | 13 |
| 4 | F 88% | (47) | 56% | (20) | 30% | (14) | 73 | I 100% | (10) | 14 |
| 5 | F 88% | (47) | 63% | (17) | 43% | (20) | 77 | F 50% | (05) | 16 |

Note. RGL = reading grade level; WPM = words per minute; I = independent; S = instructional; F = frustration.
[a]Maximum score = 20.

Table 4-11

Rank Ordering of Five Probes by Performance on Six Measures of Word Recognition, Reading Speed, and Comprehension for Subject 3

| | Word Recognition | | | Speed | Comprehension | |
|---|---|---|---|---|---|---|
| | Accuracy | Fluency | SelfCorrect | WPM | Question | Retell |
| Rank | Probe# | Probe# | Probe# | Probe# | Probe# | Probe# |
| Highest | 4,5 | 5 | 5 | 5 | 4 | 2,5 |
| | 1 | 2 | 4 | 2,4 | 2 | 4 |
| | 2 | 4 | 1,3 | 3 | 3 | 3 |
| | 3 | 3 | 2 | 1 | 1 | 1 |
| Lowest | | 1 | | | 5 | |

Comprehension varied considerably across time (50-100%) with Subject 3 attaining scores at all three levels of performance. For probe 5, frustration level comprehension (50%) coincided with the highest level of accuracy, fluency, self-corrections, rate, and retelling. Yet, similar levels of performance on the reading measures for probe 4 resulted in 100% comprehension. These disparate results suggest that coordination of the various processes does not automatically result in high levels of comprehension.

Subject 4

Subject 4 was administered probes at a RGL of 3 which was equivalent to her unscaffolded instructional grade level at pretest. At posttest, no gain was evidenced on the MIDRI-R for the instructional grade level (RGL = 3). Subject 4 demonstrated a reading profile similar to the profile described for Subject 3 (see Tables 4-12 and 4-13). That is, the probes reflected an overall lack of change in word recognition as accuracy for all probes ranked at frustration with little variation in percent of accuracy (82%-88%). However, high levels of fluency corresponded with the subject's best accuracy scores, indicating an increased ability to coordinate accuracy and fluency. Reading rate was very slow for all probes. An unexpected pattern of performance was evidenced for comprehension.

Table 4-12

Percentage of Correct Responses and Actual Number of Errors Computed for Measures of Word Recognition, Reading Speed, and Comprehension for Five Probes (RGL 3) by Subject 4

| | | Word Recognition | | | | Speed | Comprehension | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Accuracy | | Fluency | SelfCorrect | Rate | Question | | Retell |
| Probe | | % | # | % # | % # | WPM | % | # | Points[a] |
| 1 | F | 85% | (59) | 44% (29) | 29% (17) | 55 | I | 90% (09) | 11 |
| 2 | F | 85% | (60) | 15% (35) | 20% (12) | 62 | I | 100% (10) | 16 |
| 3 | F | 82% | (70) | 42% (28) | 14% (10) | 50 | S | 70% (07) | 11 |
| 4 | F | 88% | (48) | 60% (18) | 15% (07) | 67 | S | 80% (08) | 13 |
| 5 | F | 88% | (48) | 63% (17) | 40% (19) | 68 | S | 70% (07) | 14 |

Note. RGL = reading grade level; WPM = words per minute; I = independent; S = instructional; F = frustration.
[a]Maximum score = 20.

Table 4-13

Rank Ordering of Five Probes by Performance on Six Measures of Word Recognition, Reading Speed, and Comprehension for Subject 4

| | Word Recognition | | | Speed | Comprehension | |
|---|---|---|---|---|---|---|
| | Accuracy | Fluency | SelfCorrect | WPM | Question | Retell |
| Rank | Probe# | Probe# | Probe# | Probe# | Probe# | Probe# |
| Highest | 4,5 | 5 | 5 | 5 | 2 | 2 |
| | 1,2 | 4 | 1 | 4 | 1 | 5 |
| | 3 | 1 | 2 | 2 | 4 | 4 |
| | | 3 | 4 | 1 | 3,5 | 1,3 |
| Lowest | | 2 | 3 | 3 | | |

Subject 4 exhibited her best comprehension (independent level) at probes 1 and 2, with the remaining probes reflecting instructional level comprehension.

Subject 5

Subject 5 was administered probes at a RGL of 3 which was .5 grade levels above her unscaffolded instructional grade level. By posttest, a RGL of 4 was attained on the MIDRI-R, indicating the probes should have become easier to read across time as instructional reading level increased. The probes reflected better comprehension across time, with initial response to questions poor (60%) and then increasing to 100% for probes 4 and 5 (see Tables 4-14 and 4-15). The highest levels of retelling occurred when comprehension was at an independent level. Word recognition did not change across time, remaining at the frustration level throughout. The highest level of accuracy was attained for probe 1. This level of accuracy was achieved by a high rate of self-correction of errors (51%), resulting in poor fluency of reading (25%). Reading rate was extremely slow, averaging only 31 wpm.

Subject 6

Subject 6 was administered probes at a RGL of 3 which was equivalent to her instructional scaffolded grade level. By posttest, a RGL of 3 was attained on the MIDRI-R without scaffolding. Probe scores reflected frustration level performance for word recognition (76%-91%) and comprehension (30%-60%) for all probes (see Tables 4-16

Table 4-14

Percentage of Correct Responses and Actual Number of Errors Computed for Measures of Word Recognition, Reading Speed, and Comprehension for Five Probes (RGL 3) by Subject 5

| | Word Recognition | | | | | Speed | Comprehension | | |
|---|---|---|---|---|---|---|---|---|---|
| Probe | Accuracy | | Fluency | | SelfCorrect | Rate | Question | | Retell |
| | % | # | % | # | % # | WPM | % | # | Points[a] |
| 1 | F 90% | (41) | 25% | (39) | 51% (21) | 32 | F 60% | (06) | 07 |
| 2 | F 78% | (87) | 15% | (35) | 20% (17) | 36 | I 90% | (09) | 16 |
| 3 | F 83% | (66) | 37% | (30) | 20% (13) | 29 | S 78% | (07) | 12 |
| 4 | F 87% | (50) | 51% | (22) | 24% (12) | 47 | I 100% | (10) | 18 |
| 5 | F 81% | (75) | 42% | (28) | 20% (15) | 39 | I 100% | (10) | 15 |

Note. RGL = reading grade level; WPM = words per minute; I = independent; S = instructional; F = frustration.
[a]Maximum score = 20.

Table 4-15

Rank Ordering of Five Probes by Performance on Six Measures of Word Recognition, Reading Speed, and Comprehension for Subject 5

| | Word Recognition | | | Speed | Comprehension | |
|---|---|---|---|---|---|---|
| | Accuracy | Fluency | SelfCorrect | WPM | Question | Retell |
| Rank | Probe# | Probe# | Probe# | Probe# | Probe# | Probe# |
| Highest | 1 | 4 | 1 | 4 | 4,5 | 4 |
| | 4 | 5 | 4 | 5 | 2 | 2 |
| | 3 | 3 | 2,3,5 | 2 | 3 | 5 |
| | 5 | 1 | | 1 | 1 | 3 |
| Lowest | 2 | 2 | | 3 | | 1 |

and 4-17). However, on probe 4, the highest level of accuracy was achieved with a correspondingly high level of fluency, self-corrections, reading rate, and the subject's second highest retelling score. This profile suggests some improvement in the subject's ability to coordinate the reading processes across time.

Summary. Examination of individual subjects' ability to coordinate word recognition, reading rate, and comprehension as measured across time revealed a variety of reading profiles. Only one subject achieved instructional level word recognition scores on any probe passage. The remaining five subjects attained word recognition scores at frustration level for all five probes, yet four of these subjects achieved either independent or instructional level comprehension scores on at least one probe. There was no correspondence between performance on probes and gain scores on the MIDRI-R. One subject, who performed at frustration level for word recognition and comprehension on all probe passages, demonstrated gains in word recognition on the MIDRI-R. Two subjects who achieved independent level comprehension on two probe passages failed to demonstrate gains in comprehension on the posttest MIDRI-R. Overall, no one pattern of coordination of the reading processes was evidenced for subjects who did or did not demonstrate gains.

Table 4-16

Percentage of Correct Responses and Actual Number of Errors Computed for Measures of Word Recognition, Reading Speed, and Comprehension for Five Probes (RGL 3) by Subject 6

| | Word Recognition | | | | Speed | Comprehension | | |
|---|---|---|---|---|---|---|---|---|
| Probe | Accuracy | | Fluency | | SelfCorrect | | Rate | Question | | Retell |
| | % | # | % | # | % | # | WPM | % | # | Pointsa |
| 1 | F 82% | (71) | 42% | (30) | 24% | (17) | 56 | F 50% | (05) | 07 |
| 2 | F 87% | (53) | 29% | (34) | 34% | (18) | 65 | F 44% | (04) | 07 |
| 3 | F 76% | (95) | 13% | (39) | 24% | (23) | 87 | F 30% | (03) | 14 |
| 4 | F 91% | (34) | 54% | (21) | 38% | (13) | 85 | F 50% | (05) | 11 |
| 5 | F 81% | (77) | 54% | (22) | 19% | (15) | 71 | F 60% | (06) | 07 |

Note. RGL = reading grade level; WPM = words per minute; I = independent; S = instructional; F = frustration.
[a]Maximum score = 20.

Table 4-17

Rank Ordering of Five Probes by Performance on Six Measures of Word Recognition, Reading Speed, and Comprehension for Subject 6

| | Word Recognition | | | Speed | Comprehension | |
|---|---|---|---|---|---|---|
| | Accuracy | Fluency | SelfCorrect | WPM | Question | Retell |
| Rank | Probe# | Probe# | Probe# | Probe# | Probe# | Probe# |
| Highest | 4 | 4,5 | 4 | 3 | 5 | 3 |
| | 2 | 1 | 2 | 4 | 1,4 | 4 |
| | 1 | 2 | 1,3 | 5 | 2 | 1,2,5 |
| | 5 | 3 | 5 | 2 | 3 | |
| Lowest | 3 | | | 1 | | |

## Conclusions

This study examined the effects of CRS as an instructional method for adult low-ability readers compared to a control group who received skill-based instruction. The results of group comparisons showed that both methods of instruction were effective in improving word recognition and comprehension abilities for most adult subjects, although both groups had subjects who did not make change following 40 hours of instruction. For both individual subjects and mean group gains, the results favored the CRS group in gains made for word recognition and comprehension, although these differences did not reach a level of statistical significance.

The CRS scaffolding employed at pretest was found to be predictive of reading gains made following 40 hours of instruction. A high correlation was maintained between the gains in reading ability demonstrated under these assisted conditions during pretest and the actual gains in unassisted instructional reading ability shown at posttest. Performance on weekly probes was less representative of actual gains made for subjects in the CRS condition. Profiles of change across time were irregular and did not reflect a smooth progression toward coordination of reading processes as reading abilities improved. The theoretical and applied implications for these findings will be discussed in the following chapter.

In addition, factors that either facilitated or inhibited reading progress will be examined.

# DISCUSSION

Adults who read at or below a fifth grade level are described in the literature as being functionally illiterate. These individuals, despite years of instruction, are unable to read at a level of proficiency that allows them to meet the daily reading demands of a information-based society. Although a range of adult education programs exist specifically to increase the reading skills of these individuals, the review of literature highlighted a lack of efficacy data on current instructional approaches. A majority of the available findings were obtained from reports on skill-based approaches that provide direct instruction for the deficit skills exhibited by this population of readers. This study investigated the efficacy of an alternative instructional approach with adult low-ability readers termed Communicative Reading Strategies (CRS). CRS instruction focused on improving reading ability by treating reading as a meaning-making process. Individual skills were not addressed, rather facilitative strategies were used to assist the reader in constructing an ongoing interpretation of the written text.

Three questions were proposed to evaluate changes in reading proficiency resulting from the integrated instruction provided through CRS scaffolding. First, would subjects receiving CRS instruction demonstrate

significant improvement in reading ability compared to a skill-based control condition? Second, would CRS scaffolding result in an increased range of reading ability, or ZPD, for adult low-ability readers? Finally, would adult low-ability readers demonstrate improved coordination of reading processes as a result of CRS instruction?

The chapter will begin with a discussion of the results of this study relative to each of the proposed questions. Next, limitations of the present study will be presented. Finally, suggestions for future research will be offered.

## Effects of CRS on Reading Performance

Question one examined the effects of CRS instruction on reading ability compared to a control condition of skill-based instruction. Three measures of reading performance, including word recognition, comprehension, and reading rate, were used to assess changes in instructional reading ability. Results revealed that following 40 hours of reading instruction, subjects in both conditions improved, with no significant effects for word recognition, passage comprehension, or reading rate attributed to either condition. This finding suggests that both methods of instruction were equally effective in terms of improving word recognition, comprehension, and speed of reading. However, the mean gain scores for word recognition and comprehension favored the CRS condition,

whereas gains in reading rate favored the control condition. The small sample size and short intervention period rendered these findings clinically important but not statistically significant.

Word Recognition and Comprehension

On the word recognition measure, the mean gain for the CRS group reflected greater than a one grade level increase in instructional reading level compared to less than one half of a grade level increase for the control group. A grade level of change indicates that subjects can read longer sentences, with more embedded clauses, more complex noun and verb phrases, more polysyllabic words containing more complex morphological structures, and more abstract concepts. Thus, while the numerical change of one grade is small, the qualitative change is impressive. Furthermore, the largest increases in word recognition were attained under the CRS condition, with one CRS subject demonstrating twice the gains made by any control subject.

The mean gain in comprehension also favored CRS instruction ($\underline{M}_{CRS} = 8.3$; $\underline{M}_{Con} = 5.2$). Three of the six CRS subjects increased comprehension approximately two grade levels, whereas only one control subject demonstrated gains equivalent to two grade levels. This instructional advantage did not hold for all CRS subjects, as three CRS subjects showed no change at posttest in grade level comprehension. However, two of these subjects

were those who did not increase in word recognition and therefore had no opportunity to show gains in comprehension since no additional passages were read. Five of the six control subjects demonstrated some gain in comprehension, whereas one subject decreased the number of correct responses to passage questions.

The greater gains in comprehension for subjects under the CRS condition were expected because of the emphasis this approach places on the meaning-making process. During reading, strategies are used to establish the meaning of unfamiliar vocabulary and to facilitate understanding of implied or inferential meanings of sentences in relationship to the overall context of the story. The gains of over two grade levels by one half of the subjects in only 40 hours of instruction suggest that being actively engaged in deriving meaning from the text does improve the ability to comprehend literal and inferential meanings.

The findings also suggest a reciprocal relationship between word recognition and comprehension. Subjects in the control condition, which emphasized word recognition skills and vocabulary development, made roughly equivalent gains in word recognition and comprehension, suggesting that improved word recognition enhances the ability to comprehend passages that are read. This is not surprising since it is difficult to comprehend information that has been only partially or even erroneously received because

of word substitutions, omissions, or other reading miscues. But the reciprocal relationship also was shown in the CRS condition where the emphasis was placed on reading for meaning, and no direct instruction occurred for word recognition. These subjects also made approximately equivalent gains in word recognition and comprehension, suggesting that facilitating meaning during reading also facilitates word recognition. This finding suggests that the relationship between word recognition and comprehension is reciprocal, and not a linear process in which word recognition precedes comprehension.

## Reading Rate

Reading rate showed minimal changes for subjects in either CRS or skill-based conditions. Group means showed a slight advantage for the skill-based group who were faster readers at pretest ($\underline{M}_{CRS}$ = 94; $\underline{M}_{Con}$ = 122) and who made greater gains ($\underline{M}_{CRS}$ = 3.3; $\underline{M}_{Con}$ = 10). For both groups, the posttest scores remained more than 100 wpm below the average reading rate for adults. For individual subjects, there was no consistent pattern between gains in word recognition or comprehension with gains in rate. For both CRS and skill-based conditions, subjects who made gains in other measures of reading may have gained or lost wpm at posttest, and some subjects who failed to make gains in other measures did improve in rate.

Subject 1 in the CRS condition is an example of one who made two grade levels of gain in word recognition and

comprehension, but decreased slightly in rate. Evaluation of reading transcripts revealed more frequent self-corrections, pauses, and comments to herself, each of which added time to her reading, but reflected better monitoring of miscues and comprehension. The slower rate at posttest, in her case, actually reflected better reading strategies. This suggests that rate is a measure of reading that reflects a complex interaction between word recognition and comprehension, and appears to be affected by many factors.

Summary

These findings are consistent with other studies evaluating the effects of CRS instruction on reading performance (Badon, 1993, Ezell, 1995, Hernandez, 1989). That is, reading performance not only improved with CRS instruction, but CRS held an advantage over other skill-based reading approaches (i.e., basal reader instruction, directed reading) on measures of word recognition and comprehension. Furthermore, the increase in reading performance, in the absence of direct instruction on word identification or comprehension skills, suggests that an integrated approach to reading intervention is as effective for some subjects and more effective for others at improving overall reading performance of adult low-ability readers.

The findings also are important when the amount of instructional time needed to effect improvement is

considered. The results reflected average word recognition and comprehension gains of more than one grade level for the CRS condition and one half a grade level for the skill-based group in only 40 hours of instruction. Further research is needed to determine if the small differences accrued to CRS instruction (approximately one half grade level difference compared to skill-based instruction) after 40 hours of instruction would continue to increase with longer periods of intervention.

Predictions Consistent with an Interactionist Model

The reciprocal relationship between word recognition and comprehension would be predicted by an interactionist model of reading development. In such a model, providing information at the level of meaning for words, concepts, relationships between words in sentences, inferences drawn from prior knowledge, and so forth, would result in the reader making associations between the meaning and the orthographic representation of the word. Words encountered and meaningfully read with high frequency would result in increasingly stronger memories and faster recognition of the corresponding orthographic pattern, so that eventually the word would be recognized in new contexts or in isolation. The exposure to the high frequency words in context also would increase awareness of the orthographic units that comprise the words. These orthographic patterns would then be more readily

generalized for new words that fit these letter sequences, thus facilitating recognition of unknown words.

This phenomenon was observed in the word recognition gains made by CRS subjects who did not receive direct instruction on word recognition. The finding that comprehension gains for CRS subjects were often more than a grade level greater for this group than for the skill-based group suggests that greater benefits are accrued to providing the information at the level of meaning. Future studies that examine effects of CRS on word recognition, word analysis, syntactic structures, comprehension of factual information, and comprehension of inferential meaning under conditions of longer periods of intervention need to be conducted to explore this relationship.

The subjects who failed to make progress in both CRS and control conditions also were consistent with an interactionist model. At a reading grade level above these subjects' instructional level, it can be proposed that only few or weak associations existed within and between the words, orthographic patterns, sentence structure, concepts, and prior knowledge encountered. This is reflected by the lack of change during pretesting under scaffolded conditions. If the concepts, words, and context have no or only weak prior associations, then scaffolding would not effect an immediate change because sufficient information could not be provided to strengthen the associations needed to produce better word recognition

and comprehension. These subjects were qualitatively different in the complexity of their existing schema at pretest from subjects attaining the same instructional reading level but who did demonstrate a grade level or more of improvement under scaffolded conditions.

Those who made gains appeared to have a partial or developing schema for much of the information encountered in the text, and with scaffolding, this information was readily activated and improvement in reading resulted. The interactions occurring within CRS serve to refine and expand this partial knowledge, as well as to establish new concepts and word patterns. Fewer gains in a short-term intervention program would be expected for subjects who did not change under scaffolded conditions because many new schema would need to be constructed and not merely refined or expanded.

Other Factors Affecting Reading Performance

Not all subjects demonstrated gains in either word recognition or comprehension, suggesting that other factors influence reading outcomes. Learning to read is dependent on social and emotional factors, as well as those directly involved in processing written text. Darkenwald and Valentine (1985) reported that responsibilities associated with family and daily life commitments may negatively impact reading progress. The two CRS subjects (subjects 3 and 4) who did not evidence improvement on either word recognition or comprehension

scores reported difficult situations in their personal lives. Serious issues with teenage children interrupted class attendance and participation. These subjects required five to six months to complete their 40 hours of instruction, whereas the other four subjects completed 40 instructional hours in 3 months time. At times, Subject 4 was present for only 10 minutes of a 75 minute session. Furthermore, when physically present, she often was not actively engaged in group interactions as evidenced by laying her head on the table, sleeping, and crying while others were reading. Similar problems interfered with at least one of the subjects in the control group who failed to make progress, although she regularly attended classes.

The absences and lack of involvement may have negatively impacted reading progress in several ways. First, the extended period of time needed to complete the required instructional hours translates into inconsistent attendance. Inconsistent attendance means that a subject seldom reads a complete story. Concepts important to a story, and the words used to express those concepts, would be expected to appear frequently in the story. Therefore, absences would limit not only the number of times the reader encounters those words, but also the contexts in which the words occurred. Within an interactionist model, fewer opportunities to read a word in a variety of contexts and sentence structures would result in little establishment or generalization of associations between

meaning and the orthographic representation of the word. Without sufficient awareness of the orthographic pattern, it would be difficult to recognize the pattern in other contexts or in isolation.

Sporadic participation also means that subjects are not present for repeated readings. Repeated exposure to text builds background knowledge. A single exposure to a new word would result in a diffuse, imprecise understanding of the word's meaning, but with frequent exposure through repeated reading, the meaning would begin to be refined. Inconsistent attendance would result in fewer opportunities to build or expand on associations between words and concepts specific to each story. The same opportunities to establish or build on existing knowledge would be lost if subjects physically were present but not actively engaged in the reading process. For example, subjects who do not look at the printed text when other group members are reading receive less visual exposure to word patterns. The associations between phonological units (activated by someone reading the text aloud) and orthographic units would not be strengthened because of the lack of simultaneous visual input.

## Effects of Subject Characteristics

For this group of subjects, age did not appear to be a factor in reading progress. The two subjects in the CRS condition who demonstrated the greatest gains in both word recognition and comprehension represented the youngest (18

years) and oldest (44 years) participants. This same pattern was evident in the control condition. The oldest subject in the study had not received formal schooling prior to enrollment in the adult literacy program. This finding suggests that CRS scaffolding can result in measurable progress in a short time period even for individuals who have not received formal schooling for an extended time. Both CRS subjects who evidenced the most gain also were the most consistent in attending sessions.

Another factor potentially influencing reading performance may be general intellectual ability. The PPVT-R had been employed as a measure of general intellectual and language ability for all subjects. Standard scores on the PPVT-R for all CRS subjects fell below one standard deviation of the mean, a frequent characteristic of poor reading achievement. Comparison of PPVT-R scores with gains made in reading revealed that the three subjects who improved in both word recognition and comprehension had quotient scores below 60. Standard scores on the PPVT-R for the control group also fell below one standard deviation of the mean with a high of 66. The three control subjects who improved in both word recognition and comprehension posted the highest PPVT-R scores. The three subjects who made no gains in word recognition and minimal comprehension gains had quotient scores below 58.

However, the relationship between gains in reading and performance on the PPVT-R were not directly correlated. Subject 1 of the CRS group attained gain scores of two grade levels in word recognition and comprehension while presenting a PPVT-R quotient of 62. The subject with the highest PPVT-R quotient of 79 (i.e., 17 points higher) showed slightly less improvement. Subject 1 was the most consistent participant and possibly the most involved in the program as she had a specific career goal that was dependent on attaining a specific reading score on the Test of Adult Basic Education. This was demonstrated by her completing 40 instructional hours weeks earlier than any other subject.

The CRS subject with the lowest PPVT-R quotient (<40, subject 6) attained gain scores of one grade level in word recognition, but decreased comprehension by one test answer. A second measure of intellectual ability, the Scholastic Abilities Test for Adults (SATA) (Bryant, Patton, & Dunn, 1991) revealed a higher quotient of 66 for this subject. This test included measures of nonverbal reasoning. The PPVT-R score, a language measure, was predictive of the difficulty with comprehension exhibited in relationship to word recognition at posttest. This finding was obtained despite the emphasis on meaning inherent in the CRS instruction, suggesting that general verbal abilities have a more direct effect on comprehension than on word recognition.

## Conclusions

The gains in word recognition and comprehension in the CRS condition that were comparable or greater than those of the skill-based condition has instructional and theoretical implications. Instructionally, the slightly greater gains in the CRS instruction demonstrate that meaningful reading can be used as a forum for learning a range of reading skills. The same activity can be used to facilitate word recognition, sentence processing, and comprehension at literal and inferential levels. This eliminates the need for expensive materials such as workbooks, flashcards, or multiple reading books.

Theoretically, the findings suggest that there is a reciprocal relationship between word recognition and comprehension. Instruction that focuses either on skills or meaning-based reading affects changes in both word recognition and comprehension. This finding challenges some traditional beliefs about reading, such as direct instruction is required to improve word recognition, that instruction on word recognition is prerequisite to comprehension, and that reading skills must be divided into parts for ease of acquisition (Adams, 1990). These findings are consistent with an interactionist model of reading.

### Effects of CRS on Range of Reading Performance

The second question addressed whether CRS scaffolding would result in an increased range of reading ability, or

ZPD, for low-ability readers. To examine this question, subjects in the CRS condition were engaged in scaffolded reading for passages that attained frustration level at pretest. Scaffolding continued until a frustration level was achieved under CRS conditions. At posttest, the differences in performance between the scaffolded and unscaffolded instructional level reading at pretest were compared to scaffolded and unscaffolded levels at posttest. Subjects who increased in reading level were compared to those who made minimal or no gain.

Analysis of results revealed two important findings. First, scaffolding provided by CRS interactions was effective in increasing both the assisted word recognition level and the assisted comprehension scores of adult low-ability readers, with increases in gain scores obtained at both pretest and posttest. These gains were obtained without intervening instruction. Second, the amount of gain in both word recognition and comprehension obtained during pretest scaffolding was highly predictive of the amount of gain in unassisted instructional level reading after 40 hours of CRS intervention.

Immediate Effects of Scaffolding on Reading Performance

For word recognition, CRS scaffolding resulted in all but one subject successfully reading at a higher grade level at pretest and four of six subjects reading at a higher grade level at posttest. Mean gains in RGL were similar at pretest ($M$ = 1.2 RGL) and posttest ($M$ = 1.1

RGL), with gains ranging from no change to two grade levels of change occurring at both testing periods.

Scaffolding resulted in comprehension gains similar to those recorded for word recognition. That is, the same five subjects who evidenced assisted word recognition gains at pretest demonstrated a mean gain of one grade level in comprehension. The four subjects who posted assisted word recognition gains at posttest, demonstrated assisted comprehension gains at posttest.

The immediate gains in word recognition and comprehension with scaffolding would be expected if word recognition and comprehension maintain a reciprocal relationship. The results are consistent with an interactionist model of reading. During scaffolding, the facilitator, using strategies such as preparatory sets, activates appropriate background knowledge. This meaning-based input assists the reader in forming a tentative hypothesis about what is to be read. Any existing associations between the reader's prior knowledge and other levels of language would be activated at the moment information was provided. Associations between meaning and the orthographic units would facilitate recognition of words already known to the reader or new words that fit the patterns of letter sequences.

Likewise, immediate gains in comprehension would be expected because of the emphasis CRS places on making sense of the text. During reading, scaffolding strategies

provide information at the level of meaning for words, concepts, relationships between sentences, and so forth, thereby aiding the reader is constructing a cohesive story. Literal and inferential questions then can be answered more accurately because associations at the meaning level have been either strengthen, refined, or expanded.

Scaffolding as a Predictor of Reading Progress

In addition to affecting immediate changes in word recognition and comprehension, scaffolding conducted at pretest was found to be positively related to actual gains in word recognition ($r$ = .6866) and comprehension ($r$ = .7362) at posttest. For four of the subjects, actual word recognition gains at posttest were within .5 grade level of the scaffolded prediction and at 1.0 and 1.5 grade levels for the remaining two subjects. The subjects who made the greatest scaffolded gains at pretest, attained higher gain scores at posttest. The subject who demonstrated no change in word recognition with scaffolding made no gains at posttest.

Similar results were evidenced for comprehension. Scaffolded comprehension gains at pretest were within one point of actual posttest gains for two subjects, and at 4 and 6 points for three subjects. Only one subject showed a much greater gain than predicted (+7 compared to +21). In all but one case, higher gain scores at posttest were attained by subjects who made the greatest scaffolded

gains at pretest. The one subject who failed to demonstrate change with scaffolding made no gains in comprehension at posttest.

Findings Consistent with Social Mediation and the ZPD

The high, positive correlation between gains in reading ability demonstrated under assisted conditions during pretest and the actual gains in unassisted instructional reading ability shown at posttest is consistent with Vygotsky's construct of social mediation and the ZPD. The immediate gains in word recognition and comprehension at pretest under scaffolded conditions represent the readers' potential for development. That is, reading skills currently in the process of development but not yet fully mature. Vykotsky (1978) proposed that this potential for learning can be facilitated through social mediation provided within the learner's ZPD. This potential development was realized as evidenced by the similarity between the scaffolded pretest gains and actual gains achieved after 40 hours of instruction. In other words, 40 hours of CRS instruction facilitated the development of the subjects' nascent reading skills, so that at posttest, with the once nascent skills more fully developed, subjects could read unassisted those passages that, at pretest, could only be read with assistance.

Two facets of CRS instruction facilitated the refinement of emerging skills that was evident at posttest. CRS instruction used text that was at least a

grade level above the adults' unassisted instructional grade level, therefore readers consistently were exposed to and immersed in reading text above their current level of independent functioning. Reading at this more difficult level was supported through the social mediation provided by CRS scaffolding. By participating in reading at the upper limit of the ZPD, nascent skills in the process of development would be strengthened and refined, while laying the foundation for more complex reading behaviors to emerge. With CRS instruction, the emergent skills became more fully developed allowing the adult learner, at posttest, to independently read more difficult passages that at pretest could only be read with assistance. Furthermore, because CRS instruction continued to be conducted in advance of completed development, the readers constantly were exposed to increasingly complex skills that allowed for the development of new emergent skills. This continued development was evident for four of the six subjects who demonstrated gains in word recognition and comprehension at posttest under scaffolded conditions.

When considered in the context of the ZPD, the positive correlation between pretest scaffolded reading gains and actual gains made after a period of instruction is not surprising. The scaffolded interactions highlighted learning that was present, albeit not yet fully developed. In an interactionist model, this level

of learning would be represented by weak or diffuse associations between any level of language knowledge. However, the frequent opportunities to engage in meaningful reading with adequate support, such as those provided through CRS interactions, would serve to strengthen, refine, and expand existing associations. These associations then could be more readily activated by the reader during unassisted reading, resulting in improved word recognition and comprehension.

The correlation between scaffolded reading and later reading achievement is an important finding. Currently, adult literacy educators have no reliable instrument or procedure for identifying individuals who would be expected to progress from reading instruction. As indicated by the results of this study, initial reading grade levels are inadequate at predicting future reading achievement. For example, three of the CRS subjects attained an instructional reading level of 3.0 RGL at pretest. At posttest, two of these subjects evidenced no change in reading level, whereas the third subject improved by three grade levels. The correlation between scaffolding gains and actual future gains may provide educators with a tool for determining appropriate program placement and the amount of time necessary to achieve success.

## Conclusions

The increase in the range of reading ability, or ZPD, with CRS scaffolding has instructional and theoretical implications. Instructionally, the high correlation between changes in reading ability under scaffolded conditions before instruction and unassisted gains after 40 hours of instruction demonstrates that scaffolding is useful as an assessment tool to determine a reader's potential for progress. Knowing a reader's scaffolded instructional reading level facilitates selection of text at an appropriate level of difficulty (i.e., at or near the upper limit of the reader's ZPD) so that maximum benefits can be achieved from instructional time. The gains at posttest in word recognition and comprehension with CRS scaffolding were attained from small group instruction. Providing instruction in small groups, allows teachers to assist more learners.

Theoretically, the results of this study support Vygotsky's construct of a ZPD and the role of social mediation in learning. Scaffolding provided by a more experienced reader, at a level above the learner's independent reading ability, effects immediate and short-term changes in both word recognition and comprehension. This finding challenges some current reading practices in adult literacy education, such as deficient low level reading skills must be remediated before a reader may

advance to more complex tasks, and that adult low-ability readers need one-on-one reading instruction.

As scaffolding was shown to be predictive of future reading achievement after 40 hours of instruction, changes in reading ability across shorter increments of time were explored in question three. This question evaluated whether the effects of CRS instruction would be evident across time in the subjects' ability to read with increasing accuracy, fluency, speed, and comprehension.

### Effects of CRS on Reading Measured Across Time

The final question examined the effects of CRS instruction on the ability of adult poor readers to coordinate the processes necessary for skillful reading. Five probes provided measures of reading accuracy, fluency, correction of miscues, rate, comprehension, and story retelling across time. These data then were used to reveal patterns of reading performance within and across subjects.

It was predicted that as reading ability improved, this improvement would be reflected in higher accuracy, fluency, speed, and comprehension on probes 4 and 5. However, group performance did not follow the prediction, with many subjects demonstrating their best performance on the first two probes. Furthermore, the subjects who demonstrated better performance on the fourth and fifth probes evidenced no gain on the MIDRI-R. When individual performances were examined, no single reading profile

emerged. Only one subject achieved instructional level word recognition scores on any probe passage, yet four subjects attained instructional level reading scores at posttest that equalled the reading level of the probes. One subject attained an unassisted instructional word recognition level on the MIDRI-R at posttest equal to the reading level of the probes, although accuracy scores for all probe passages were at the frustration level.

Intermittent Probes as a Measure of Reading Progress

Several factors specific to the content of the passages may have concealed the improvement in reading skill that was evidenced on the MIDRI-R at posttest by four of the six subjects. Probe passages were selected from a commercially-prepared book of timed readings that were judged to be at a specific level of readability. The probes proved to be very different in content and writing style from either the daily readings or the MIDRI-R passages. According to the author, the timed readings were chosen based on the Fry readability formula (1977). This formula included a measure of word complexity (i.e., mean number of syllables per word) and syntactic complexity (i.e., mean number of words per sentence), however, no consideration was given to the relevance of the content to the subjects' interests or lives. All the fourth and fifth grade level selections were excerpts from classic literature. The stories were conceptually abstract and included use of Old English grammar and

regional dialects, making them more difficult to read than other texts at the same readability level. In contrast, the MIDRI-R passages included topics regarding common experiences and interests, and selections read during instruction were chosen for their relevance and interest to the class members. Therefore, the lack of measurable improvement in the coordination of the reading processes may have been a by-product of the probes' content.

The interaction of reading selections with individual performance was evident in the uneven progression toward better coordination of reading processes across time. Four subjects attained their lowest or second lowest rankings in rate, passage comprehension, and retelling on a story about a city boy's summer vacation in Australia catching yabbies (a crustacean). In all but one case, performance on probes immediately preceding and following this probe, although at the same readability level, attained higher rankings in rate, comprehension, and retelling.

Progress coordinating the reading processes across time also was impacted by the questions used to measure passage comprehension. Three subjects demonstrated consistent problems answering passage comprehension questions for the same probe administered after either 30 or 40 hours of instruction. Two subjects attained their lowest comprehension rating on this probe despite producing their highest or second highest level of

accuracy, fluency, self-corrections, rate, and retelling. Although the third subject did not attain her lowest comprehension rating for this probe, only 50% of the questions were answered correctly.

## Conclusions

Probes used to evaluate changes in the readers' accuracy, fluency, rate, and comprehension after every 10 hours of CRS instruction provided limited information on overall improvement in reading performance. The value of probe measurements was negatively impacted by the content and style of the selections. These characteristics resulted in passages that were more difficult than predicted by the readability formula that considered only word and sentence complexity. Probes that are selected with a consideration for their relevance and interest to the readers may provide a more reliable indication of progress across time. However, gains in reading achievement may not be evidenced as a smooth progression. The irregular reading profiles attained on the probes for all subjects indicate that interactions between the reader and the text are occurring across the different measures impacting the coordination of the reading processes.

## Limitations of the Study

Results of this study provide support for CRS instruction as an alternative approach for improving the reading ability of adult low-ability readers. The findings also suggest that the results of scaffolded

interactions prior to instruction provide a reliable indication of individuals who would or would not be expected to make immediate changes in reading achievement for both skill-based and CRS instruction. However, as highlighted in the review of literature, many of the difficulties that plagued past research in adult literacy education also impacted this study. These issues will be discussed as they apply to generalization of the results.

First, although significance was not reached, the trends in the data for word recognition and comprehension favored CRS scaffolding over skill-based instruction. The mean gain differences of one grade level or greater were obtained in a short period of instruction. It cannot be determined whether, with continued intervention, this advantage would continue to increase or if differences would be eliminated. Both the short period of intervention and the high level of attrition, rendering it difficult to keep subjects for a longer time period, presented limitations to the study and to the interpretation of the results.

A second, related limitation of the study is the relatively small sample size. Small samples make it difficult to identify significant differences in the data, or to determine if results are generalizable to other populations. Therefore, is unclear whether failure to achieve significance for the reading measures should be attributed to no real differences between CRS and

skill-based instruction or to the small sample size. Replication with larger groups is necessary to adequately evaluate the effects of CRS instruction and the generalizability of findings.

Third, subjects were included in the study based primarily on their instructional reading grade level. However, many characteristics important to a complete reading profile, such as a full-scale intelligence quotient, general language ability, family history, and motivation for participation, were not controlled. Fear of failure and negative experiences with testing greatly restricted the amount of pretreatment assessment that could be conducted without potential subjects withdrawing from the study. Therefore, although both instructional approaches resulted in subjects who made gains and subjects who did not, these differences in performance could not reliably be attributed to a single variable, thereby limiting generalization of the results. Additional assessment may have revealed existing differences in subjects that could be considered to influence treatment outcomes.

A fourth limitation of this study also is related to the instructional reading level of the subjects. The CRS subjects began the study 1.4 reading grade levels below the control group. Although this difference was not statistically significant, the greater gains evidenced by the CRS group may be due to regression to the mean rather

than to effects of treatment. However, the gains evidenced by both groups also may be interpreted according to the Matthew effect. That is, the control group would be expected to make greater gains than the CRS group because they began the study with higher reading skills. Accordingly, the higher reading gains demonstrated by the CRS group, who began with less reading knowledge, suggests that CRS instruction may have resulted in greater differences than indicated by the statistical analysis.

Fifth, this study included only adults with instructional reading grade levels ranging from second to fifth grade. Replication with adults at different instructional reading levels will be necessary to adequately evaluate the results. Additionally, the current results were obtained on a self-selected portion of the adult low-literate population. That is, adults who not only chose to participate in an adult education program, but persisted in the program. Subjects who completed the study may be different from adult low-ability readers who drop out or those who never participate. Therefore, generalization of findings is limited to the population of adults who maintain participation and may not be applied to the adult low-literate population as a whole.

Sixth, the instrumentation employed in this study may have impacted results. Because only one test form was available, the same test was utilized at pretest and

posttest for all subjects. Therefore, improvement may have been a result of experience with the test. Future studies should consider use of different test forms or inclusion of a control group who does not receive any type of intervention to control for the test-retest effect.

A final limitation of this study concerns the implementation of CRS scaffolding. CRS is a complex approach that requires a thorough understanding of how meaning is expressed through various language forms and syntactic structures. Unlike the step-by-step procedures that can be followed to implement instruction in skill-based programs, the CRS facilitator must be able to predict where a reader will experience difficulty with the language of the text and respond instantaneously with feedback appropriate to what has just been read. Because many adult literacy educators are part-time personnel or volunteers, the considerable time required to become proficient with CRS may limit replication with the adult population of poor readers.

## Suggestions for Future Research

Results of this study yielded several potential avenues for future research exploring theoretical issues and instructional applications. There are a limited number of studies utilizing CRS scaffolding as an instructional reading approach. Three studies have evaluated the efficacy of CRS with at-risk children because of low socio-economic status (Badon, 1993),

children with reading and language delays (Ezell, 1995), and low-achieving children in the regular classroom (Hernandez, 1989). One study (Schutz, 1988) investigated the effects of CRS with adults with aphasia who had lost their reading ability. Significantly greater gains in word recognition and comprehension was obtained with CRS instruction as compared to other skill-based approaches. Although the results of those studies showed positive effects for CRS, all the studies involved a small number of subjects, primarily children. Replications with a larger number of children and adult low-ability readers are needed to support the efficacy of CRS scaffolding techniques.

The adult low-ability readers who participated in this investigation exhibited instructional reading levels ranging from second to fifth grade. One subject with a third grade instructional reading level demonstrated three grade levels of progress, whereas another subject with the same reading level evidenced no change. The wide range of progress exhibited by these subjects suggests that CRS may have differential effects for adult readers who differ according to reading level or currently unidentified variables. Studies with subjects at varying reading levels would provide additional insights into the interaction of CRS with reading levels or other subject characteristics that serve either to facilitate or inhibit reading progress.

This study investigated the effects of CRS compared to skill-based instruction provided through a series of workbooks and computer programs. Future studies could compare the effects of language experience approaches, whole-word instruction, or specific computerized instruction to the effects of CRS scaffolding.

There also is a need to examine the long-term effects of CRS scaffolding. Four of the six subjects in this study demonstrated the potential for continued reading progress as evidenced by scaffolded word recognition and comprehension gains at posttest. Studies that provide instruction for longer periods of time might offer insights into the value of continued exposure to CRS scaffolding.

Finallly, results of this investigation lend support to the Vygotsky's construct of the ZPD and the role of social mediation in learning. Social mediation provided through CRS scaffolding at levels above the learner's current level of independent reading was predictive of the amount of gain in unassisted reading after 40 hours of instruction. The predictive value of CRS scaffolding needs to be replicated and explored with other populations of readers.

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## APPENDIX A

## CRS TECHNIQUES

Preparatory Sets
- assist the reader to activate appropriate background knowledge
- can prep set any linguistic unit of text (word, phrase, sentence, paragraph)

Acknowledgement
- provides feedback to reader by confirming what has been read and understood
- treats reading as natural communication where speakers and listeners take turns

Expansion
- rewording text information into grammatically more complete sentence
- more complete sentences generally include relational terms, such as conjunctions (i.e., because, so, when), verb tense markers (e.g., will, did, should), or adjectives and adverbs
- helps to explicitly establish connections between ideas

Extension
- linking one idea to a second related idea
- extends the topic to include the next action in a sequence, the consequences to an action or state, or a reaction to a situation

Expatiation
- consists of elaborations on an idea or concept to establish greater meaning, to clarify unfamiliar vocabulary, to explain a metaphor or other figurative language, or to model inferences and interpretations

Association
- links are established between new information read and ideas that had been stated in previous pages, paragraphs, or episodes
- helps reader understand that meaning crosses the boundaries of sentences, paragraphs, and pages

Parsing
- chunking complex sentences into smaller units to aid processing of the ideational relationships within sentences
- helps reader to see how sentence is made up of smaller semantic units

Generalization
- links events, morals, or states in the story to similar situations in other contexts, such as the reader's own experiences or community, national or world events

Semantic Cue
- assist in retrieving or recognizing a word that is miscued or difficult to decode
- synonyms, definitions, or related words are given to help establish the correct network of information
- if the word is not in the child's lexicon, it may be modeled in context

Fluent Reading
- fluent reading of sentence or phrase is used to model how the elements of the sentence work together to communicate meaning
- used when reader struggles with text and other scaffolding strategies alone are not successful in helping reader to construct meaning
- direct reader to look at the written words while the facilitator reads
- simultaneously lets reader see and hear how the sentence functions

Paraphrase
- rewording the text after it is read
- difficulty of the vocabulary may be reduced
- unfamiliar words may be defined through descriptions or use of synonyms
- complex sentences can be reworded in shorter, simpler sentences
- interpretations or other cues to meaning can be given

Summarization
- can be oral retelling or summary
- can include rereading parts of passages to integrate the ideas

## APPENDIX B

### CONSENT FORM

TITLE: Reading Instruction for Adults with Marginal Reading Skills

Dear Adult Learner,

INVITATION TO PARTICIPATE:

You are invited to participate in a research project. The project is designed to provide you with personal instruction in reading. It will also help me learn more about how language and literacy develop in adults.

PURPOSE OF THE STUDY:

Many adults do not read as well as they need to in order to get the job they want or to advance in their area of work. Others struggle in obtaining their GED because of low reading skills. The purpose of this study is to determine whether a highly-scaffolded, meaning-based reading program will help adults increase their reading level.

EXPLANATION OF PROCEDURES:

I am seeking permission for you to participate in this project. I am asking permission to test your reading skills at the beginning of the project, and then again after 40 hours of instruction. If you are selected to be included in the study, you will also be tested after every ten hours of instruction to chart your reading progress. I will make audio tape recordings of your reading that will be used to monitor your progress. These recordings also will be used for research. You will receive at least 40 hours of reading instruction in a small group setting. Some of these sessions may be video recorded.

POTENTIAL RISKS AND BENEFITS:

This study does not involve any risk to you. You will receive a free evaluation of your reading skills. You will receive instruction in reading as part of the project.

ASSURANCE OF CONFIDENTIALITY:

All information collected during this study will be treated confidentially. Identification numbers rather than names will be used on records, and your name will not appear anywhere in written research reports. However, there is a possibility of your first name being mentioned on educational videotapes.

WITHDRAWAL FROM THE STUDY:

Participation in the project is voluntary on your part. If you decide to participate, you are free to withdraw your consent and to discontinue the study at any time.

OFFER TO ANSWER QUESTIONS:

If you have any questions, please feel free to contact any of the researchers listed below. If you are willing to participate, please sign and return this form to Sara Reichmuth at LSU. Thank you for your interest in this project.

YOU ARE VOLUNTARILY MAKING A DECISION WHETHER OR NOT TO PARTICIPATE. YOUR SIGNATURE INDICATES THAT, HAVING READ THE INFORMATION PROVIDED ABOVE, YOU HAVE DECIDED TO PARTICIPATE. YOU WILL BE GIVEN A COPY OF THIS CONSENT FORM TO KEEP.

| | |
|---|---|
| _____ | _____ |
| Signature of Participant | Date |
| _____ | _____ |
| Signature of Investigator<br>Janet Norris, Ph.D.<br>LSU 388-3936 | Signature of Investigator<br>Paul Hoffman, Ph.D.<br>LSU 388-2545 |
| _____ | _____ The participant's initials indicate that this form was read and explained to the participant. |
| Sara S. Reichmuth<br>Student Investigator | |

## APPENDIX C

## DIALECTAL VARIATIONS

Miscues produced as a result of dialectal variations of phonology, morphology, and syntax were not included in the total miscue count. Dialectal variations were based on works by Craig and Washington (1995), Fasold and Wolfram (as cited in Haynes & Shulman, 1994), and Jeter (1977). Exclusion was based on the following criteria.

**Verbs**: Any alteration in verb tense including deletion of tense marker, hypercorrection, or production of incorrect verb form. Also included in this category was the deletion or addition of a morphological marker for a verb functioning as another part of speech such as an adjective or noun.

Examples: peek for peeked (deletion)
lookted for looked (hypercorrection)
sink/sanked for sank (incorrect form)
distinguish for distinguished person (adjective) stowed-away for stow-away (noun)

**Plurals**: Addition/deletion of plural endings for nouns.

Examples: mens for men (hypercorrection)
hand for hands (deletion)

**Possessives**: Deletion of 's morpheme on possessive nouns.

Examples: girl for girl's

**Contracted Forms**: Deletion of the to be forms is, are, and the future indicator will in contractible contexts.

Examples: he for he's
you for you're
she for she'll

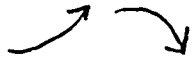
**Indefinite Articles**: Substitution of a for an.

**Phonological Variations**: Individual words pronounced with different phonological patterns were not marked as a miscue if the word form was used appropriately in conversational speech. Alterations resulting from final consonant cluster reduction or sound substitutions in blends.

Examples: throught for thought (individual variation)
mine for mind (cluster reduction)
skreet for street (sound substitution)

APPENDIX D

MISCUE CODING SYSTEM

| Miscue | Symbol | Coding Procedure |
|---|---|---|
| | <u>Accuracy-related Miscues</u> | |
| Substitution | | Substituted word (including mispronunciation, partial or non-word substitution) is written above the replaced text. |
| Insertion | ^ | Caret placed below line of text at point of miscue. Added word is written above the text. |
| Omission | ------- | Horizontal line is drawn through omitted word. |
| Reversal |  | Transposition marks placed around reversed words. |
| Self-correction |  | Circle corrected word. |
| Dialect Variation |  | Circled "d" placed above miscue attributed to dialect. |
| | <u>Fluency-related Miscues</u> | |
| Repetition | _____ | Repeated word or words is underlined. |
| Phrasing | / | Slash mark placed through missed punctuation. |
| Pauses |  | Pauses of more than 5 seconds marked with elongated "p". |
| Intonation |  | An inappropriate intonational rise or fall is marked with arrows. |

APPENDIX E

STORY RETELLING CODING PROCEDURES

**Definitions for Coding T-units**

**Abandoned Utterance**: Any utterance that was not finished or reformulated.

Examples: They have clues but they think it might be for religion or>

I mean [p]>

**Maze**: Any filler, false start, repetition, reformulation. Asides or "thinking aloud" statements were mazed within the T-unit. Appositives were not mazed.

Examples: (They um) Jamie bit the apple (but) but he couldn't eat it (because) because the juice did something (to his) to his throat.

(Um basically) it's about an Indian named Sequoya.

And (um i forgot the lady name that went to see her) one her friends want to see her one last time.

And the mother she didn't really want one.

**Pause**: Any pause that lasted 5 or more seconds.

Examples: And [p] (and) it took years to make.

To go down to a lower level the gates open so [p] the boats go through it.

**Message error**: Any utterance that was inaccurate/false, unclear as to meaning, or redundant in content.

Examples: So they both jumped the fence again and ran down by the creek with the apple. (Explanation: both characters did not jump the fence so message was inaccurate or false.)

I wish I could keep some of this stuff. (Explanation: statement did not refer to story or probe context.)

**Clarity Error**: T-unit represented true information but word choice or word order was not clear or specific. Dialectal variations were not included in this category.

Examples: For our bodies, you need to put the right food groups in to keep it healthy. (poor word choice)
They ran across the field trying to get away the man. (Explanation: the word "from" was omitted between away and the.) (word order error)

The story about a horse named Black Beauty. (Explanation: T-unit not marked with an error code because the absence of the copula "is" is a dialectal variation.)

**Other**: Any statement unrelated to story content.

Examples: I didn't really understand what I read.

**Procedures for Coding Transcripts**

1. Transcribe oral retellings verbatim using SALT procedures.

2. Code each line of the transcript using the following marks (see definitional guidelines):

Abandoned Utterance = >
Maze = ( ) enclose mazed portion of utterance
Pause = [P]
Other = [O]
Clarity Error [CE]
Message Inaccuracy = [MI]

3. Run the SALT program and record the following:

Total number of T-units minus (O + >) _____
Total number of fluency errors (( ) + P) _____
Total number CEs _____
Total number MIs _____

4. Determine the ratio of T-units without accuracy, fluency, and clarity errors to total number of T-units minus (O + >)

Percent accuracy _____
Percent fluency _____
Percent clarity _____

## Definitions of Story Elements

**Setting:** Introduced the main character(s) of the story.

**Initiating Event (Problem):** Began a goal-based sequence that evoked an immediate response from a character.

**Attempt:** Character's overt action or strategy to resolve the situation or obtain the goal.

**Direct Consequence (Conclusion):** Character's success or failure at attaining the goal(s); any changes in the sequence of events that resulted from the character's action.

## Retelling Scoring Guide

**Completeness**

4 Two complete episodes (8 story elements)
3 One complete episode and one partial episode or two partial episodes (6 story elements)
2 One complete episode or two partial episodes (4 story elements)
1 Two partial episodes (fewer than 4 story elements)

**Organization**

4 Both episodes are consistent in structure with written story
3 At least one episode is consistent with structure of story
2 Episode(s) or partial episode(s) is lower in structure than written story; no higher than an ordered or reactive sequence
1 Episode(s) or partial episode(s) is no higher than a collection or descriptive list

**Story Accuracy**

4 90-100% of the T-units relate accurate information
3 75-89% of the T-units relate accurate information
2 50-74% of the T-units relate accurate information
1 Less than 50% of T-units relate accurate information

**Fluency**

4 90-100% of the T-units are fluent
3 75-89% of the T-units are fluent
2 50-74% of the T-units are fluent
1 Less than 50% of the T-units are fluent

**Clarity**

1 90-100% word order and word choice are clear/specific
2 75-89% of the T-units are clear and specific
3 50-74% of the T-units are clear and specific
4 Less than 50% of the T-units are clear and specific

## Retelling Evaluation Scale

### Completeness

| 4 | 3 | 2 | 1 |
|---|---|---|---|
| 8 elements | 6 elements | 4 elements | <4 elements |

### Organization

| 4 | 3 | 2 | 1 |
|---|---|---|---|
| Episodes match written text | One episode matches text | Complete/partial episode(s) lower in structure than text | Complete or partial episode below collection or descriptive list |

### Accuracy

| 4 | 3 | 2 | 1 |
|---|---|---|---|
| 90% accuracy | 75% accuracy | 50% accuracy | <50% accuracy |

### Fluency

| 4 | 3 | 2 | 1 |
|---|---|---|---|
| 90% fluency | 75% fluency | 50% fluency | <50% fluency |

### Clarity

| 4 | 3 | 2 | 1 |
|---|---|---|---|
| Word order and choice clear and specific | 75% clear and specific | 50% clear and specific | <50% clear and specific |

TOTAL POINTS _____

## APPENDIX F

## EVALUATION OF CRS TECHNIQUES

Directions: Read the following statements and then view the videotapes provided. The tapes include 15 minutes of three, randomly-selected group reading sessions. Based on what you observe, rate the facilitator's use of the strategies identified below by circling Yes, No, or N/O for each question. Use the following guide:
**YES** = facilitator used the strategy
**NO** = facilitator failed to use the strategy
**N/O** = no opportunity to use the strategy

| | | | | |
|---|---|---|---|---|
| 1. | Were preparatory sets used to activate the reader's background knowledge? | YES | NO | N/O |
| 2. | Was the level of preparatory sets (e.g., phrase, sentence, paragraph) adjusted to meet the needs of the reader? | YES | NO | N/O |
| 3. | Was the reader provided with an opportunity to read text that corresponded to the preparatory set? | YES | NO | N/O |
| 4. | Did the facilitator acknowledge the communicative value of what was read by responding to the meaning expressed through the reading? | YES | NO | N/O |
| 5. | Was feedback provided that increased the complexity of the text that was read (i.e., expansions)? | YES | NO | N/O |
| 6. | Was feedback provided that elaborated on the information communicated by the text (i.e., expatiations)? | YES | NO | N/O |
| 7. | Did the facilitator link ideas from one phrase or sentence to the next idea (i.e., extensions)? | YES | NO | N/O |
| 8. | Did the facilitator model appropriate interpretations, inferences, or evaluations of the text? | YES | NO | N/O |
| 9. | Was parsing used when needed to reduce complex sentences into their constituent parts? | YES | NO | N/O |

| | | | | |
|---|---|---|---|---|
| 10. | When the reader miscued, were semantic cues such as synonyms provided to aid word retrieval? | YES | NO | N/O |
| 11. | Were phonetic cues provided to aid word retrieval? | YES | NO | N/O |
| 12. | Did the facilitator model fluent reading when appropriate? | YES | NO | N/O |
| 13. | Did the facilitator paraphrase text to make the meaning clearer? | YES | NO | N/O |
| 14. | Did the facilitator provide associations or transitions that helped the reader to connect new information to what had already been read? | YES | NO | N/O |
| 15. | Were the readers provided with opportunities to reread text? | YES | NO | N/O |

# VITA

Sara Reichmuth is a speech-language pathologist with 7 years of experience working in the public schools of Nebraska. During the past two years, she worked as a consultant on a Louisiana State University family literacy training grant providing reading instruction for adult low-ability readers and co-taught a summer institute training teachers to work with adult low-ability readers. Ms. Reichmuth also presented papers at national and regional conferences including the annual convention of the American Speech-Language-Hearing Association (ASHA).

Ms. Reichmuth holds the Certificate of Clinical Competence in speech-language pathology from ASHA and is licensed to practice speech-language pathology by the Nebraska State Board of Health. Her areas of professional interest include evaluation and treatment of speech-language impaired preschool and school-age children, with a special focus on the relationship between language and reading disorders.

# DOCTORAL EXAMINATION AND DISSERTATION REPORT

**Candidate:** Sara S. Reichmuth

**Major Field:** Communication Disorders

**Title of Dissertation:** Efficacy of Communicative Reading Strategies as an Instructional Approach for Adult Low-ability Readers

**Approved:**

Janet Norris
**Major Professor and Chairman**

**Dean of the Graduate School**

**EXAMINING COMMITTEE:**

Paul A. Hiff

James B. Ostetter

Hugh W. Buckingham

Roy C. LaGrone Jr.

**Date of Examination:**

10/29/96