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# Decoding multisyllabic words: Structural analysis in reading by groups

ABSTRACT. An age appropriate, research-based systematic program that teaches a flexible strategy for decoding multisyllabic words may be the foundation for increased reading abilities of middle school male and female students struggling with grade level text. To meet this need, the *REWARDS* reading program (Archer, Gleason & Vachon, 2000) was used with struggling 6th grade readers with learning disabilities (LD). The quasi-experimental research design used in this study is non-randomized control group ($n$ = 20), pretest- posttest design. The Basic Reading Inventory along with DIBELS measure of reading fluency were the instruments used to calculate findings. In a five week period, students' decoding levels increased by 1.72 grade levels, instructional reading levels increased by 1.45 grade levels, while the reading fluency rates were increased by 28% at instructional reading levels and 17% at grade level. Decoding ability was highly correlated to reading comprehension with the relationship of .88.

KEYWORDS: decoding, multisyllabic words, reading by groups

## Introduction

### Reading difficulties

Reading is an integral aspect of life. Understanding what is read is crucial to academic success. This is especially true for students with learning disabilities (LD). It is not uncommon for this population of secondary school students to read significantly below grade level, making academic success challenging. Nagey and Anderson (1984) found that each year students in the middle grades read between 100,000 and 10,000,000 words, 10,000 of which are new, and a great majority are multisyllabic (Cunningham, 1998). A great reading disparity exists in individuals as is indicated by the number of words read yearly. If

reading deficits are not remediated, the disparity between the proficient and poor will continue to increase. This is known as the "Mathew Effect" in reading; it applies to students with LD as the example of "the poor get poorer" (Stanovich, 1986, p. 382).

The impact of this disparity on the self-esteem of poor readers affects their likelihood of completing high school while increasing the likelihood of these students exhibiting challenging behavior (Juel, 1996). Seventy-five percent of unemployed adults and 60% of prison inmates are illiterate (Orton Dyslexia Society, cited in Fuchs et al., 1991). Twenty-five percent of adults cannot read directions on a prescription, or decode a note sent home from school—they are functionally illiterate. Illiteracy figures are even more staggering for adults with LD with estimates as high as 73% (Riley, 1996). These statistics should inspire educators to find the most effective methods for promoting students' reading development.

Difficulties have emerged with the traditional approach to teaching decoding. Decoding strategies are usually confined to primary grades and limited to monosyllable words. Although most readers implicitly learn how to apply these strategies to longer words, students with LD often need explicit instruction (Carnine, Silbert & Kameenui, 1997). Older students have been taught strategies which are based on complicated syllabication rules or that prescribed rote learning of common phonogram patterns. Canny and Scheiner (1976) state that "neither instructional approach led to improved decoding performance" (p. 123). These syllabication rules, which emphasized consonant combinations and locations, placed little value on vowel sounds. The ability to divide words into dictionary syllables neither proved to be an indication of reading ability nor was reading ability even related to this skill. Canny and Schreiner (1976) suggest a more flexible approach for word division needed to be explored in the classroom.

Therefore, an age appropriate, research-based systematic program that teaches a flexible strategy for decoding multisyllabic words is the foundation for increased decoding, reading fluency and comprehension abilities of secondary school students struggling with grade level text (Archer, Gleason & Vachon, 2003). *Reading Excellence: Word Attack and Rate Development Strategies* or *REWARDS* is designed for this population (Archer, Vachon & Gleason, 2000). The purpose of this study is to determine if *REWARDS* is a valid means of increasing the decoding, reading fluency, and reading comprehension skills of 6th

grade boys and girls with LD. Another question was to determine the relationship between decoding skills and reading comprehension ability for the students in this study.

## Reading research

The ultimate purpose of reading is comprehension (Stanovich, 1991) or understanding what has been read. In order to increase reading comprehension, fluency must be attained. Fluency is the ability to read with speed, accuracy, and expression. Accuracy and speed are increased by improved word recognition skills. Word recognition refers to linking the printed representation of a word with its meaning. Decoding is translating printed words into a representation similar to oral language, and thus decoding facilitates word recognition (Carnine, Silbert & Kameenui, 1997; Stanovich, 1991). Therefore, it becomes obvious that if students cannot read grade level materials because of decoding difficulty, they will be unable to read with fluency or comprehend much of what they read.

## Decoding instruction research

Decoding has generally been taught through phonics. Phonics instruction is a means of teaching reading that stresses the acquisition of letter-sound correspondences and their use in reading and spelling (National Reading Panel [NRP], 2000). Phonics instruction is built upon the assumption that students are aware that spoken words are made from discrete speech sounds, or phonemes. Once this awareness is developed and students are able to manipulate sounds within words, the alphabetic principle is applied (Adams, 1999). The alphabetic principle states all phonemes in oral language have corresponding symbolic representations known as letters (Carnine, Silbert & Kameenui, 1997). Reading programs that are based on explicit direct instruction in the alphabetic principle have shown great advantages when working with at-risk children in preventing reading failure (Foorman et al., 1998).

The NRP's (2000) meta-analysis revealed five major categories of phonics instruction. Analogy phonics teaches students to compare unfamiliar words to words students already know. An example of phonics by analogy begins by recognizing that the rime or final segment of an unfa-

miliar word is similar to one that is familiar then by blending the known rime with the new word's onset or initial word portion. The analytic phonics method teaches students to analyze letter-sound relations in previously learned words. The purpose of this method is to avoid pronouncing sounds in isolation. Analytic phonics may be practiced by drawing a struggling student's attention to a vowel sound in a known word and then by applying it to a new, unknown word. Embedded phonics incorporates phonics instruction into text reading. This implicit method relies on incidental learning. Phonics is also taught through spelling lessons. This teaches students to segment words into phonemes and select letters for those phonemes (spelling phonetically). The final method is known as synthetic phonics instruction. This method is based on the idea that students should be taught explicitly to convert graphemes into phonemes and then blend the phonemes into recognizable words. The NRP found that synthetic phonics programs which emphasized direct instruction enhanced children's success in learning to read. Systematic synthetic phonics instruction is significantly more effective than other phonics instruction methods for students with learning disabilities and students who are low-achieving.

As students' word recognition skills increase, they are able to use patterns and analogy to decode—most decoding is performed by finding familiar patterns in words; the patterns are often morphemes—root words, suffixes, and prefixes (Cunningham & Cunningham, 2002). English is a morphologically connected language and it is estimated that for every word you know, you can quickly learn between six and seven other words sharing the same morpheme (Nagy & Anderson, 1984). The problem struggling readers possess is that the partitioned units within words they process are too small; poor readers pronounce unfamiliar words by individual sounds with occasional blends, and as the units of recognition are increased, reading changes to a more holistic process that leads to automaticity (Samuels, LaBerge & Bremer, 1978). Eye movement studies indicate that the human brain recognizes known patterns with words (Rayner & Pollatesk, 1989) and direct instruction of patterns within words may be the answer to the ever increasing multisyllabic word reading (Cunningham, 1998).

Structural Analysis teaches students to decode multisyllabic words through the recognition of root words, prefixes, and suffixes (Carnine, Silbert & Kameenui, 1997); thus, increasing the size of the units processed in multisyllabic words. It is a flexible strategy rather than a set of

fixed rules to memorize, and this strategy flexibility leads to a greater likelihood of generalization (Lenz & Hughes, 1990). Students' reading errors were reduced when they were instructed in a structural analysis based strategy (Lenz & Hughes, 1990). The promise of enhanced reading ability provided by such programs is great for students with learning disabilities in secondary schools who are unable to effectively read multisyllabic words, and therefore sacrifice their level of reading comprehension and limit academic success. One such program is entitled *REWARDS* (Archer, Vachon & Gleason, 2000). It is a short-term intervention that teaches struggling readers a flexible decoding strategy to read longer words which contain most of the meaning in text. *REWARDS* also focuses on fluency instruction.

## Research validation of REWARDS

In recognition that 74% of students with reading disabilities in third grade continue to have significant reading challenges in ninth grade (Lyon, 1995), *REWARDS* provides systematic instruction in decoding. As Moats (2001) stated, secondary students need systematic instruction in age appropriate material in order to remediate reading discrepancies. *REWARDS* uses careful wording in its scripted delivery as to not offend the sensitivities of this population of adolescents. The importance of this characteristic is self-apparent to anyone who has worked with this population of students.

## Phonics instruction

In order for phonics material to be effective, it must be systematic with direct-instruction (Swanson, 1999). *REWARDS* is intensive in its level of direct instruction. It carefully teaches the preskills to the decoding strategy before introducing it in total. Students are given direct instruction in diphthongs, referred to as "vowel combinations," and extensive review opportunities are provided. A review of vowel sounds is provided and common confusion is eliminated that results from naming vowel phonemes "short" and "long" because vowel sounds are the same length. Therefore, a vowel's two phonemes are referred to as the vowel's "sound" and "name." All vowels are then practiced in

"word parts" that are common portions of larger words students are likely to encounter during future reading.

Students with reading disabilities are more likely to mispronounce affixes and disregard large portions of letter information, and are four times more likely to omit syllables (Sheflebine & Callhoun, 1991). *REWARDS* provides direct instruction in common prefixes and suffixes. These are introduced in small number and reviewed daily. This critical component was proven essential because it provides students with alternative decodable chunks, or visual patterns, within multisyllabic words (Sheflebine, 1990). Cunningham (1998) found that by teaching 50 words with the most common affixes, it would give struggling readers access to over 800 other words. Explicit direct instruction in prefixes and suffixes may provide students access to thousands of words previously unreadable to them. Students are then given practice opportunities to identify these affixes in words and taught that not all words have "beginning" or "ending" word parts.

Oral activities which provide students the opportunity to blend syllables are provided. Syllables are first presented by the teacher at a slow pace and then by asking students "What word?" Opportunities are provided for students to find alternative pronunciations for mispronounced words. Sheflebine (1990) indicates the importance of finding alternative pronunciations until a match was found in their own lexicon. This corrective procedure is practiced daily with whole group choral response to eliminate isolating individual students who make miscues. Intermediate-age students with learning disabilities made significant gains on multiple measures of word recognition when a "part-by-part" decoding strategy was given for four weeks and involved students drawing loops under pronounced syllables (Archer, Vachon & Gleason, 2003). *REWARDS* expands on this strategy having students circle prefixes, then by circling suffixes, and by underlining vowel graphemes in the remaining section of the multisyllabic word. Students sound out the middle portion (knowing that for each vowel sound, there is one word part or syllable), then pronounce the parts in sequence, which finally leads to saying the word and accessing it from their lexicon making it a "real word." Without the ability to decode multisyllabic words, students will not read with adequate fluency and thus not gain access to the meaning of what is being read. Therefore, increasing reading fluency is a critical aspect of improving the decoding skills of older students with learning disabilities.

## Reading fluency research

Someone who reads fluently gives little conscious attention to decoding (Meyer & Felton, 1999). Struggling readers give much of their finite cognitive resources to decoding, and thus often miss the meaning of what has been read (LaBerge & Samuels, 1974). Reading becomes a laborious task to be avoided; thus, struggling readers who are most in need of daily reading practice experience delays in the development of automaticity (Moats, 2001). They are more likely to perform preferred activities such as watching television rather than completing homework assignments, possibly due to experienced difficulties in reading fluency (Archer, Gleason & Vachon, 2003). Therefore, struggling readers require frequent structured fluency practice incorporated into their academic lives to decrease the Mathew Effect in reading and increase overall academic success.

Reading practice is generally recognized as an important contributor to fluency. Guided oral reading encourages students to read passages orally with systematic, explicit guidance and feedback from the teacher. Guided oral reading is a way for teachers to effectively model reading with proper rate, pronunciation, and prosody in small group settings as listening to good models of fluent reading, students learn how a reader's voice can help text make sense (Kuhn & Stahl, 2003). The NRP (2000) concluded that guided oral reading procedures that included guidance from teachers, peers, or parents had "a significant and positive impact" on word recognition, fluency and comprehension across a range of grade levels (p. 12).

Passage reading is incorporated into *REWARDS* as it provides the opportunity for fluency building. Guided reading practiced in isolation may fail to provide the needed reading practice for struggling secondary students. Thus, *REWARDS* advocates the use of choral reading in which students read the passage simultaneously with the teacher in unison as this insures greater participation, and allows for increased practice opportunities (Rasinski et al., 1994). The cloze method is also suggested: the teacher reads the passage aloud and pauses periodically, cuing students to respond chorally to the next word; this is a useful way to monitor student participation. Partner reading is also suggested as it allows students additional repeated readings with a peer. Fuchs et al. (2001) found that the use of partner reading significantly improved reading fluency scores on multiple measures for struggling readers.

Samuels (1979) concluded that some students were not building fluency when reading orally because they seldom had the opportunity to read any selection more than once. Effective repeated reading procedures contain two components: (1) they provide students with many opportunities to practice reading, and (2) they provide students with guidance in how fluent readers read insuring feedback to increase awareness and correction of their mistakes (Osborn & Lehr, 2003). This guidance and feedback can come from peers, parents or teachers (NRP, 2000). *REWARDS* advocates the use of repeated readings in passage reading sections to improve fluency. After the teacher models fluency through choral reading or the cloze method, the students are given a one minute individual practice. Next, the students separate and partner read, providing one another feedback on miscues. Pairs should include a relatively high and low reader. After several practice sessions, students exchange books and read for one minute, each in turn underlining any miscues of the other. This final reading is used to determine the Words Correct per Minute (WCM). Fluency scores are graphed providing students visual representations of progress.

## Research summary

The ultimate purpose of reading instruction is to improve reading comprehension. If students have difficulty with decoding, these skill deficits need to be addressed to bridge the growing reading disparity. Decoding has been addressed through various methods, but to maximize effectiveness, initial phonics instruction should be systematic and synthetic. Once students word recognition skills are improved, phonics instruction based on analogy which provides direct instruction in morphemes is beneficial. Structural analysis teaches students to decode multisyllabic words through the recognition of root words, prefixes, and suffixes. *REWARDS* teaches a flexible strategy based on structural analysis to decode multisyllabic words and provides exercises designed to increase reading fluency. However, despite the fact that this program is based on research validated principles, there are no independent studies validating the outcomes of a 1.5 grade level increase as stated by the authors of *REWARDS* (Archer, Gleason & Vachon, 2003). Therefore, it is hypothesized that the *REWARDS* intervention will increase sixth grade students with learning disabilities decoding levels, which will lead to increased reading fluency, and overall gains in

reading levels of 1.5 grades. It is also predicted that there is a strong correlation between decoding and reading comprehension. The null hypothesis is that *REWARDS* will not lead to significant gains in decoding, reading fluency, or overall reading levels of 6th grade students with learning disabilities and that there is no significant relationship between decoding skill levels and reading comprehension.

## Methodology

The middle school from which the student participants were selected was located in a lower middle-class neighborhood in the suburbs of Los Angeles, California. The student body was comprised of approximately 1,200 students with 83% Hispanic, 12% white non-Hispanic, 3% Asian, and 2% from various other racial and cultural backgrounds. The school was selected due to the investigator's access to its students enrolled in special education. Permission from the principal and parents of participating students was acquired to collect data from an intervention already in use. The purpose of the study was described to the administration and parents as the validation of a district-endorsed reading intervention taught by the researcher to students with special needs during the spring of 2004. Data would be collected on students who had participated in the intervention and would include decoding levels, reading fluency, and reading comprehension scores.

### Participants

The convenience sample consisted of 22 6th grade students who were part of the researcher's caseload of special education students in a Resource Specialist Program (RSP) who had participated in the intervention. Of these students, 20 consent forms were obtained. The students qualified for Special Education Services under state and federal requirements and all had Individualized Education Plans (IEP) with objectives in the area of reading.

The participants' ethnic and racial backgrounds were representative of the school's overall population; 80% of the population was Hispanic, and 20% was White, non-Hispanic. The sample consisted of 11 boys and 9 girls—all of whom were designated with LD.

## Research instruments

Two primary instruments were used in the data collection procedure. The first instrument used was the Basic Reading Inventory (BRI) (Johns, 2001). First, graded word lists were used to determine the students' decoding level. The decoding level was used to determine the initial reading comprehension passage; these passages provided contextual word identification measures as well as literal and inferential questions which aided in determining the reading comprehension GE. The students' independent, instructional, and frustration reading levels were then determined by factoring decoding ability with reading comprehension levels. Both the instructional decoding and word recognition levels were used in determining the overall decoding GE for each student. The statistical mean decoding GE was calculated from these two measures.

The second instrument used was the Dynamic Indicators of Basic Early Literacy Skills (DIBELS) (Good & Kaminski, 2002). DIBELS are a set of standardized, individually administered measures for early literacy skills. Each measure has been thoroughly researched and demonstrated to be reliable and valid indicators of early literacy development. The Oral Reading Fluency subtests follow a curriculum-based assessment model in using 1-minute timings to determine reading rates or fluency; four subtests were read at the students' individual instructional reading levels as determined by the BRI. These passages were scored and values expressed in WCM. The statistical mean for reading fluency will be generated from the four readings for each student as this has been determined to be a valid method (Kamps et. al., 2003).

## Data collection procedures

The pretest measures were given to both groups one week prior to the beginning of the intervention. The BRI was administered in order to calculate reading levels. Students' instructional reading levels were used to administer the DIBELS Oral Reading Fluency subtest. Four passages at the student's instructional reading level were used to generate a mean WCM. Also, four passages were administered at the students' grade level and mean WCM scores were calculated. The same assessment procedures were followed one week after the intervention and served as the posttest

### Intervention

Procedures were followed as outlined in the teacher training for passage reading. This consisted of teacher modeled passage reading with fluency and accuracy. Next, students were matched in groups based on ability, one stronger reader paired with a less proficient reader. The stronger reader read first to provide an additional model, while the other partner provided oral corrections; each student read a passage one time with the other providing necessary feedback. The researcher listened briefly to each group to insure maximum participation. Students' workbooks were exchanged and partners timed the other for one minute. The timer was also responsible for underlining errors made by their partner while reading. These errors were subtracted from the total words read to generate total WCM. These were charted for students' visual feedback on reading fluency progress.

## Results

### Decoding

The pretest mean (*M*) decoding level of the control group was 5.05 GE and the intervention group pretest *M* = 3.25. The control group posttest *M = 5*.13 and the intervention group posttest *M = 5.05.* The change in the mean between the tests for the control groups was 0.08 grade level. The change in the mean between tests for the intervention group was 1.8 grade levels. When the change in *M* of the control group was subtracted from the M change of the intervention group (to account for maturation), there was a net change of 1.72 grade levels.

Table 1

Mean Decoding Levels

| *n* = 1O | Pre-Test | Post-Test | Growth |
|---|---|---|---|
| Control Group | 5.05 | 5.13 | 0.08 |
| Intervention Group | 3.25 | 5.05 | 1.8 |

Note. Units expressed in grade equivalency

## Instructional reading levels

Results from the BRI mean instructional reading levels for both groups were determined. The control group pretest *M = 4.6* GE, and the intervention group pretest *M* = 3.4 GE. The posttest control group *M* = 4.9, while the posttest intervention group *M = 5.15.* The change between tests for the control group was 0.3 grade levels. The change between tests for the intervention group was 1.75 grade levels. The changes in between tests were subtracted to reach a total change among groups of 1.45 grade levels.

Table 2

Mean Instructional Reading Levels

| *n* = 10 | Pre-Test | Post-Test | Growth |
|---|---|---|---|
| Control Group | 4.60 | 4.90 | .3 |
| Intervention Group | 3.40 | 5.15 | 1.75 |

Note. Units expressed in grade equivalency

## Reading fluency

The pretest reading fluency score for the control group at their instructional reading level was M = 78.08 WCM, and the intervention group was *M = 65.76* WCM. The control group's posttest score at their instructional reading level was *M = 91.45* WCM, while the score of intervention group was M = 84.15 WCM. Scores indicate increases of 13.37 WCM for the control group and 18.37 WCM for the intervention group at students' instructional reading levels.

The pretest reading fluency score for the control group at grade level was M = 85.16 WCM and 68.65 WCM for the intervention group. The posttest score for the control group was 86.45 WCM. The intervention group's fluency measure was M = 80.13 WCM. Posttest scores indicate increases of 1.29 WCM for the control and 11.48 WCM for the intervention group (please refer to Table 3 fort-test information.

## Pearson r

The Pearson r was calculated to discover the relationship between decoding skill levels and reading comprehension ability. The entire sample of 20 students was used to generate the figure of .88; this indi-

cates that a strong relationship between decoding skill and reading comprehension ability exists within this study (please refer to Figure 1). The t-test for the Pearson r was referenced and the minimum level of .38 was necessary to reject the null hypothesis.

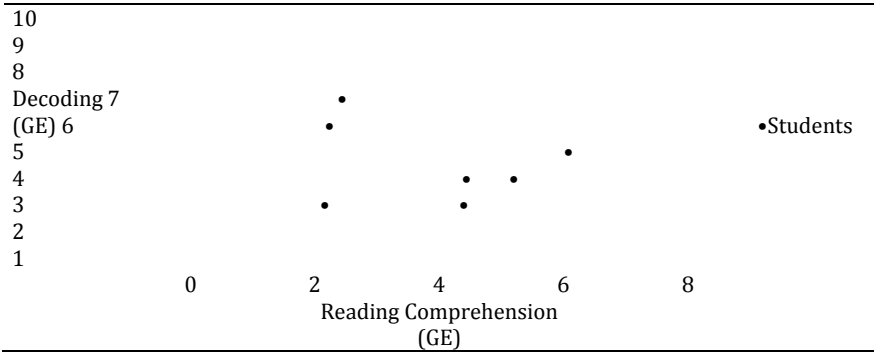


Figure 1. Pearson r Coefficient Correlation

Note. All scores reported in grade equivalency (GE). Pearson r = .88. n = 20

## Discussion

The effects of the *REWARDS* intervention upon this sample of students were evident in the overall scores. Students showed significant gains in decoding and reading comprehension, with less significant growth in reading fluency. A strong correlation was demonstrated between decoding skills and reading comprehension.

### Decoding

Systematic, structural analysis based programs have been proven successful in teaching decoding and phonics to older students. *REWARDS* emphasized both structured introductions and reviews of affixes and vowel sounds, provided practice for identification of these affixes within words, and gave students a flexible decoding strategy for multisyllabic words. Lessons provided constant exposure to new vocabulary as well as extensive review. Students appeared to be able to read longer words with more efficiency and confidence. In addition, students' multisyllabic word recognition and automaticity increased.

Students' decoding levels increased by 1.73 grade levels in a five-week period. The control group's gain of only 0.08 GE during this time demonstrate relatively expected gains for students not exposed to systematic phonics instruction. Thus, the null hypothesis was rejected based upon the outcome of the posttest decoding portion of the BRI. *REWARDS* is a valid means of increasing sixth grade students with LD decoding skills.

## Instructional reading levels

Despite modifications and accommodations, students with LD are often denied access to the core curriculum. Intuition alone informs one that if students are unable to decode text, they will have little success in understanding what has been read; research undoubtedly supports this cognition. With 80% of all words being multisyllabic and containing at least one affix, the likelihood of comprehending text for students experiencing decoding deficits decreases dramatically as student advance through school. Therefore, increasing struggling readers' reading comprehension is crucial to academic success.

The control group experienced gains of 0.3 GE in a five-week period. For students who lag behind non-disabled peers in reading comprehension, this type of gain is not enough. This vulnerable population will never compensate for the Mathew Effect. They will continue to fall further behind with each passing day. Instructional reading levels increased by 1.45 grade levels which indicate that *REWARDS* assisted the intervention group to achieve significant gains in understanding what they read. Their mean instructional reading level rose to 5.15 GE. Despite this significant gain, on average these students will have difficulty understanding 6th grade level text. Due to significant increases by the intervention group as compared to the control group over the same period of time, the null hypothesis was rejected as *REWARDS* is a valid means of increasing students reading comprehension.

## Reading fluency

Reading fluency is a natural extension of decoding skill. Research supports the relationship between reading fluency and reading comprehension based upon the idea of limited cognitive resources; if one spends an

inordinate proportion of cognitive energy on decoding, there is little left for comprehension. Students' reading fluency scores at their instructional reading levels increased by 18.37 WCM and the control group increased by 13.37 WCM. T-test scores for both groups indicate that increases in reading fluency were not likely due to chance. The intervention group outgained the control group on grade level passages as well. The intervention group increased by 11.48 WCM versus the control group's 1.29 WCM. The t-test score indicates that the gain demonstrated by the intervention group was significant, with the control group's insignificant gain likely due to chance. The reading fluency data for *REWARDS* supports the assumption that it is an effective intervention for increasing reading fluency scores for the population and thus the null hypothesis is rejected. Intervention group increased by 28% and the control group by 17% which seem significant, but students from both groups are still far below the grade level expectancies of between 125 and 150 WCM. On grade level passages, the intervention group's reading rate increased by 17% and the control group's by 2% Asindependent reading levels, students reading rates at grade level remain far behind grade level expectancies. The Connecticut Longitudinal Study at Adolescence (1999) rightfully titled "Persistence of Dyslexia," found that while decoding and comprehension scores may be improved in students with reading disabilities, reading fluency measures lag drastically behind, sometimes never improving. Students with LD continue to struggle reading fluently even after receiving training. They labor through difficult text and often develop compensatory skills, such as an over reliance on context clues, in order to comprehend what they read. These students remain in the drowning world of word-by-word readers flooded by an ever increasing reading demand never fully developing the academic life saving skill of prosody.

## Decoding and reading comprehension

In conducting background research for this study, it became apparent that the relationship between reading fluency and reading comprehension was known, but the data for decoding and reading comprehension was not as readily accessible. The relationship between decoding and reading comprehension seems obvious, therefore studies that provide this correlation measure are intriguing to those facilitating academic success for struggling readers The Pearson r was calculated to generate such a finding.

The Pearson r was calculated to discover the relationship between decoding and reading comprehension. The entire sample of 20 students was used to generate the figure of .88; this indicates a very strong relationship between the two variables. Given that correlation does not indicate causation, it is safe to state (with a correlation of .88) that improving students' decoding skill levels will likely increase reading comprehension abilities.

## Differences among groups

Due to sampling procedures, significant differences emerged in reading abilities among groups. There were differences between the instructional reading levels of each group from the onset. The control group was composed of significantly higher readers with *M* reading level 1.2 GE above the intervention group. Students in the control group read at a higher level and read with greater fluency. Such significant differences among groups make comparison tenuous.

## Student outcomes

Student outcomes were possibly limited due to behavior challenges within the intervention group. Several students needed behavioral support throughout the intervention. The overarching dynamic of the intervention group was at times volatile. Outbursts were common, and classroom management strategies beyond those suggested by the authors were necessary. The intervention group required frequent motivational conversations regarding the impact improved reading abilities has on one's life. Students complained of being bored with the curriculum and its repetitive nature. This was the most challenging group the researcher had taken through *REWARDS* and stating that outcomes may be greater for other groups is reasonable.

## Future research

Promising areas for future research emerged as a result of this study. Conducting this experiment using methodology incorporating probability sampling to obtain a greater sample size would enable greater generaliza-

tion. This would provide professionals in education greater confidence and surety in the findings. Changes in the self-perception of students have been observed as their reading skill improved. The qualitative gain in self-confidence and self-advocacy as a result of increased reading skill level may interest those in the field of Special Education. With the findings of the Connecticut Longitudinal Study (1999) as they relate to reading fluency, do structured reading fluency training programs offer students with LD long term reading skill improvement, or would they be more benefited by other types of reading interventions? These are three areas implicated for future research generated by this study.

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