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## A randomized control study of instructional approaches for struggling adult readers

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### Abstract

This study measured the effectiveness of various instructional approaches on the reading outcomes of 198 adults who read single words at the 3.0 through 5.9 grade equivalency levels. The students were randomly assigned to one of the following interventions: Decoding and Fluency; Decoding, Comprehension, and Fluency; Decoding, Comprehension, Fluency, and Extensive Reading; Extensive Reading; and a Control/Comparison approach. The Control/Comparison approach employed a curriculum common to community-based adult literacy programs, and the Extensive Reading approach focused on wide exposure to literature. The Fluency component was a guided repeated oral reading approach, and the Decoding/Comprehension components were SRA/McGraw-Hill Direct Instruction Corrective Reading Programs. Results indicated continued weaknesses in and poor integration of participants' skills. Although students made significant gains independent of reading instruction group, all improvements were associated with small effect sizes. When reading instruction group was considered, only one significant finding was detected, with the Comparison/Control group, the Decoding and Fluency group, and the Decoding, Comprehension, Extensive Reading and Fluency group showing stronger word attack outcomes than the Extensive Reading group.

### Keywords

Adult literacy; Adult Basic Education; Instructional Effectiveness

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The field of adult literacy suffers from a paucity of thorough and methodologically sound studies, and researchers have not studied the learning and instructional processes of adults nearly as extensively as those of children and adolescents (Greenberg, Fredrick, Hughes, & Bunting, 2002). Therefore, we know very little about why many adults have difficulty reading and what kinds of instructional approaches are most beneficial for them (Snow & Strucker, 2000). The handful of existing studies presents a picture of adults who often avoid reading (Smith, 2007) and struggle with many of the reading-related processes. Specifically, adults who struggle with their reading are known to have poor decoding, phonological, receptive vocabulary, fluency, naming speed, and reading comprehension skills (e.g., Greenberg, Ehri, & Perin, 1997; Kutner, Greenberg, & Baer, 2006; Sabatini, 2002; Winn, Skinner, Oliver, Hale, & Ziegler, 2006).

This study<sup>1</sup> focused on the following: decoding, reading comprehension, fluency, and extensive reading. **Decoding** is the ability to read novel stimuli by applying knowledge of sound-symbol relationships and spelling patterns. This ability is important because it enables

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readers to identify words they do not readily recognize by sight. **Reading comprehension** is the ultimate goal of reading; to understand the text that is on the page. In order to comprehend, the reader actively constructs meaning while reading (National Institute of Child Health and Human Development, 2000). **Fluent reading** is considered critical for individuals to be able to comprehend text. In order for individuals to comprehend text, they need to be able to recognize automatically words, so that energy involved in reading words does not draw attentional capacity away from resources needed for comprehension (e.g., Laberge & Samuels, 1974; Nathan & Stanovich, 1991; Perfetti, 1992; Perfetti, & Hart, 2002). Finally, **extensive reading** is also considered important. Exposure to print enables readers to practice their reading skills (Smith, 2007). Researchers have reported strong correlations between frequency of reading and reading achievement (e.g., Anderson, Wilson, & Fielding, 1988; Stanovich & West, 1989).

Some evidence from early studies suggested that adults can improve their reading skills. For example, Gombert (1994) reported that phonological deficits of adult nonreaders can be remediated; Morais, Bertelson, Cary, and Kolinsky (1988) reported that there is no age-based critical period for illiterate adults to learn to analyze sounds; Gold and Horn (1982) reported that participation in literacy programs can increase adults' word-analysis skills and Kruidenier (2002) reported studies which indicate that struggling adult readers can benefit from explicit reading comprehension instruction. However, these earlier studies were isolated findings and suffered from methodological flaws such as, poor description of instructional approaches, number of instructional sessions, and sample characteristics, as well as small sample sizes, and inclusion of different confounding variables. Torgerson, Porthouse, and Brooks (2005) in their review of adult literacy instructional effectiveness studies, indicate that in general, the published studies suffer from a lack of adequate attention to issues such as attrition, baseline group difference in analyses, and description of outcomes.

Adult literacy educators disagree on the best way to teach adults how to read. The explicit skills instruction approach directly teaches adults how to decode and comprehend. The implicit approach encourages students to read text that is of interest to them without directly teaching them decoding and comprehension skills (Degener, 2001). This study focused on the effectiveness of both explicit and implicit reading instruction to adults who read single words between the 3.0 and 5.9 grade equivalency levels. The explicit approach taught was the SRA/McGraw Hill Direct Instruction Corrective Reading program. This approach follows the practices recommended by the National Institute of Child Health and Human Development, (2000) review of successful instruction for children, and implications drawn from the limited research available on adult reading instruction (Kruidenier, 2002). Research has indicated that this program is effective with elementary, middle, and high school students in both general and special education (e.g., Fredrick, Keel, & Neel, 2002; Heller, Fredrick, Tumlin, & Brineman, 2002). Greenberg, et al. (2002) piloted Corrective Reading with 11 adults who read at the mid-second grade levels and found that the program could be implemented with adults.

In Corrective Reading, tasks are introduced in a graduated sequence of steps with students only exposed to material that they are ready to master. Massed practice and immediate specific feedback (Grossen, 1996) ensures that students master each skill before new material is taught. Instructor materials include scripts for instructors to follow, and throughout the scripted lessons, learners frequently respond in unison. The program includes decision rules for the teacher to use in providing additional instruction depending on learners' difficulties.

To represent the more implicit approach to reading instruction, this study included the Extensive Reading approach (Krashen, 1993). Studies have indicated that Extensive Reading is a successful approach for promoting interest in reading, and for increasing reading vocabulary for university students, as well as for clerical workers (McQuillan & Rodrigo, 1998; Rodrigo, McQuillan, & Krashen, 1996). In this approach, students are offered an assortment of authentic materials at their reading levels and are encouraged to choose books to read. This selection of reading materials makes it possible for individuals to choose reading materials based on their interests, rather than based on a predetermined curriculum. It is assumed that if individuals choose their own reading materials, they will be motivated to read and if provided with a chance to read, they will increase their reading skills (Day & Bamford, 2000). The teacher acts as a role model of a reader, and does not present explicit instruction on how to read. Although many studies show the effectiveness of the Extensive Reading approach with both adults and children (Day & Bamford, 2000), none of the studies employ systematic scientific measures and controls. The Extensive Reading approach was included in this study because it follows the approach espoused by adult learning theorists who stress the importance of andragogy and self-directed learning in which adults control their own learning activities and the teacher acts as a facilitator/guide (Merriam, Caffarella, & Baumgartner, 2007).

## Purpose and Hypotheses of the Study

The primary aim of this study was to investigate which intervention or combination of interventions is the most effective in increasing the reading and reading-related skills of adults who read between the 3.0 and 5.9 single word grade equivalencies. The proposed interventions focused on remediating deficits in decoding, fluency, and reading comprehension, and varied from very explicit and scripted instruction to more implicit and learner-centered instruction. Students were randomly assigned to one of the following approaches: **D**ecoding and **F**luency (DF), **D**ecoding, **C**omprehension, and **F**luency (DCF), **E**xtensive **R**eadng (ER), **D**ecoding, **C**omprehension, **E**xtensive Reading, and **F**luency (DCEF), and a **C**ontrol/**C**omparison approach (a generic approach common to some community-based literacy programs; C/C). The primary hypothesis was that adults reading between the 3.0 and 5.9 grade levels would benefit from a combination of explicit and implicit instruction. Therefore, it was hypothesized that the DCEF condition would be more effective than any of the other conditions.

## METHOD

### Participants

Potential participants from 23 adult literacy programs were identified by classroom teachers as reading within the second through sixth grade levels on the Test of Adult Basic Education (CTB/McGraw-Hill, 1994). Students who expressed interest in the study were administered the Woodcock Johnson Psycho-Educational III (WJ) Letter and Word Identification Test (Woodcock, McGrew, & Mather, 2001), and only those who received raw scores between 42 and 57 (3.0–5.9 grade reading equivalencies), and were interested and available to attend classes four days a week, each day for two hours, were invited to continue with the study. The participants were randomly assigned to one of the four reading interventions or to the comparison condition.

One thousand one hundred seventy four participants were screened, and 629 qualified (mean raw WJ Word Id score = 49.76; reading grade equivalencies,  $M = 4.29$ ). Of this 629, 428 agreed to be pretested, 395 attended the first day of class, and 277 attended class through the midpoint assessment. Of these 277, 57% were African American, 23.5% were Hispanic, 12.6% were Asian, 5.8% were Caucasian, and 1.1% were Bi-racial. The sample included

67.1% female and 32.9% male participants, and their mean age was 35.79 years (range = 16–78). Their mean raw WJ Word Id score (mean=49.72; reading grade equivalency  $M=4.29$ ) was nearly identical to the larger 629 who qualified.

Initially, it was anticipated that this study would only focus on native speakers of English. However, it became quickly apparent that the adult literacy programs included many students who spoke English as their second language (ESL) who were integrated with the native speakers in reading classes that were geared towards native speakers. Therefore, both native speakers and ESL speakers were included in this study. The inclusion of ESL speakers in this study reflects the presence of ESL speakers in many reading classes in adult literacy programs (e.g., Greenberg, 2008). In this study, participants for whom English was not their first language were included based on adult literacy program placement into these class levels, resulting in the following demographic breakdown: 49.1%: native speakers and 50.9%: ESL speakers.

Of the 277 who attended class through the midpoint assessment, 256 were post-tested. Criteria were created to ensure that the participants included in the data analyses had been exposed to reading instruction for a requisite number of hours. To be included in the data analyses, participants had to have been exposed to a minimum of 30 instructional hours at the midpoint ( $M = 49.74$ ,  $SD = 3.34$ ) and a minimum of 60 instructional hours at the posttest ( $M = 93.97$ ,  $SD = 10.28$ ). Further, participants had to have at least 20 hours of reading instruction between their midpoint and posttest assessments ( $M = 44.22$ ,  $SD = 9.66$ ). These criteria left 198 participants from 12 adult literacy programs in the final data analyses. The mean number of hours of attendance at the midpoint and posttest time points by reading instruction approach is presented in Table 1.

This reduced sample did not differ significantly from the original sample in mean WJ Word ID reading scores (mean raw WJ Word Id score of 49.85; with a corresponding mean reading grade equivalency of 4.30). The sample was composed of 108 African Americans (54.5%), 55 Hispanics (27.8%), 24 Asians (12.1%), and 11 Caucasians (5.6%). One hundred thirty-three were female (67.2%) and 65 were male (32.8%). Eighty-eight participants (44.4%) spoke English as a first language and 110 (55.6%) spoke English as a second language. Thus, the final sample used in all analyses was proportionately similar with respect to demographic distribution when compared to the original sample of 277. This reduced sample also did not differ significantly ( $p > .05$ ) in age ( $M = 36.76$ , range = 16–78) from the original sample. Further, as can be seen in Table 2, the scores on language and reading measures at entry into the study evidenced by the reduced sample did not differ meaningfully from the original sample of 277.

Twenty nine percent of the participants repeated at least one grade in school and 49% reported graduating from high school. Fifteen percent attended special education classes while attending school and 21% reported having a family member who had problems learning to read.

## Procedures

**Assessments**—The Pretest Battery included: the WJ III Letter and Word Identification, Word Attack, Passage Comprehension, and Reading Fluency subtests (Woodcock et al., 2001); the Peabody Individual Achievement Test-Revised (PIAT-R) Spelling Subtest (Frederick & Markwardt, 1997); the Boston Naming Test (Kaplan, Goodlass, & Weintraub, 2001); the Comprehensive Test of Phonological Processing (CTOPP) (Wagner, Torgesen, & Rashotte, 1999) Elision, Blending, and Rapid Letter Naming subtests; the Peabody Picture Vocabulary Test-III (PPVT) (Dunn & Dunn, 1998); the Gray Oral Reading Test-IV (GORT) (Wiederholt & Bryant, 2001); the Test of Word Reading Efficiency (TOWRE) (Torgesen &

Wagner, 1999) Sight Word Reading Efficiency and Phonemic Decoding Efficiency subtests; the Test of Language Development, Intermediate, Third Edition (TOLD I:3) (Hammill & Newcomer, 1997) Word Ordering subtest; and a house constructed Demographic Interview. The Posttest Battery included all of the pretest assessments minus the demographic interview. The midpoint and the six month follow-up test batteries included: the WJ Word Identification, Word Attack, Passage Comprehension, and Reading Fluency subtests (Woodcock et. al, 2001); the PIAT-R Spelling Subtest (Frederick & Markwardt, 1997); the Boston Naming Test (Kaplan, et. al., 2001); the GORT (Wiederholt & Bryant, 2001); and the TOWRE (Torgesen & Wagner, 1999) Sight Word Reading Efficiency and Phonemic Decoding Efficiency subtests.

Participants were individually tested by trained graduate research assistants. Testing was completed in one session (1–2 hours). The graduate research assistants were experienced in literacy testing and understood the sensitivities of working with struggling adult readers. Training sessions in all testing procedures were explicitly conducted with them, and they were observed testing before being permitted to test on their own. Within 3 days of test administration, each test folder was examined for accurate testing procedures. If errors were noted, the participant was retested on the specific test.

**Professional development**—The teachers were research teachers hired specifically for this study and they were randomly assigned to instructional approaches. They all had prior teaching backgrounds, though none had experience in any of the approaches used in this study. Prior to teaching, they received one week of training in adult literacy awareness/sensitivity as well as training in each approach. Once classes were in session, coaches observed each teacher five times during the year. Based on weekly integrity observations, as necessary, teachers received additional training.

**Description of approaches**—Each of the five classes received 8 hours of instruction a week (2 hours Monday-Thursday) for an opportunity of 100 hours of instruction. Participants were randomly assigned to either DF, DCF, ER, DCEF or C/C. The distribution of ESL students across conditions was relatively equal across all groups with the exception of the DF group (about 35% native and 65% ESL).

DF, DCF, and DCEF all included the SRA/McGraw-Hill Direct Instruction Corrective Reading Program. In the Decoding component (D), students learned skills such as phonemic relationships, new sound combinations, word endings and letter and sound combinations. In the Comprehension (C) component, students learned how to organize groups of related facts, and how to utilize analogies, classifications, deductions, inductions, descriptions, conclusions, contradictions, and written directions. Lessons help learners to develop the background knowledge, vocabulary, and thinking skills needed to construct meaning from text. Corrective Reading placements tests were used to place students into their appropriate levels. Ninety-four percent of the students started instruction in Decoding B2, and 6% in Decoding B1. Eighty-five percent of the students started instruction in Comprehension B1 and 15% in Comprehension A.

An additional strategy to build fluency and recommended for use with Corrective Reading programs is for learners to independently practice a passage until they improve their correct words read per minute of that passage by 40% over baseline (Carnine, Silbert, & Kameenui, 1997). Three of the instructional conditions included this additional fluency practice component (DF; DCF; DCEF). A guided repeated oral reading approach was used. Teachers provided each participant with a passage at his or her instructional level. Passages were taken from Timed Readings Plus (Spargo, 1989) and Jamestown Fluency Readers (Blachowicz, 2004). To obtain a baseline level of correct words per minute, each participant

read his or her passage aloud to the teacher. The target correct words per minute for each participant was a 40% increase over baseline. Participants were given a stopwatch and asked to practice their passages independently for 15 minutes until they could read them at the target rate. When participants were ready, they read to the instructor and if they met or exceeded the target rate, they moved on to a new passage for which a new baseline was identified.

Extensive Reading (Krashen, 1993) was administered to two of the five groups (ER and DCEF). An extensive library of high interest/low vocabulary books was made available. These books were purchased from publishing companies such as New Readers Press and Peppercorn Books (companies that specialize in selling books geared to new adult readers). In this approach, students engaged in sustained silent reading, a read aloud activity during which the teacher read aloud while the participants followed along in their own copy of the book, and discussions about the books everyone was reading (for more information on how these classes were structured, see: Greenberg, Rodrigo, Berry, Brink, & Joseph, 2006; and Rodrigo et al., 2007).

Time was allocated as follows: DF: 100 minutes of decoding, 15 minutes of fluency, 5 minutes break; DCF: 50 minutes of decoding, 50 minutes of comprehension, 15 minutes of fluency, 5 minutes break; DCEF: approximately 33 minutes each of decoding, comprehension, and extensive reading, 15 minutes of fluency, 5 minutes break. The average number of decoding lessons completed in the DCEF condition was 35.88; in the DCF condition, 47.75; and in the DF condition 75.37 lessons. The average number of comprehension lessons completed in the DCEF condition was 30.88 and in the DCF condition 33.85.

The ER students engaged in two silent sustained reading blocks of 40 minutes, 15 minutes of teacher read aloud activities, 10 minutes each of book discussion on the silent sustained reading and read aloud activities and a five minute break (in the DCEF condition, this was roughly broken down into 18 minutes of sustained silent reading, 10 minutes of teacher read aloud, and 5 minutes of book discussion). The participants in the comparison/control group (C/C) were taught in a manner which was popular in a few of the local community based literacy programs. A loose curriculum without specific time allocations was provided to teachers advising them to focus on teaching prime frequency words, W-H questions (who, what, when, where, why, how), spelling, oral reading, journal writing, categorization of words, sentence structure, and mechanics of punctuation. Teachers were told that the personal interests of the students should guide material selection and the focus of each lesson. Books were not used in this condition, but teachers could use excerpts from books if students' interests dictated their appropriateness (for example, an inspirational essay could be used to guide a writing activity).

At the time of assignment to groups, there was an average of four participants to each instructional group. Of the 277 who attended class through the midpoint assessment, 256 completed the study. Forty-nine participants (19.1%) were assigned to the C/C condition, 58 (22.7%) were assigned to the DCEF condition, 37 (14.5%) were assigned to the ER condition, 62 (24.2%) were assigned to the DF condition, and 50 (19.5%) were assigned to the DCF condition. When the sample was reduced to 198 for final data analyses, the distribution across reading instruction groups was proportionately similar. Forty participants (20.2%) completed the C/C condition, 49 (24.8%) completed the DCEF condition, 22 (11.1%) completed the ER condition, 46 (23.2%) completed the DF condition, and 41 (20.7%) completed the DCF condition. These numbers indicate, therefore, that attrition rates across time points was similar among all reading instructional groups.

**Treatment fidelity checks**—Trained observers went to classes on a random day each week. Each approach had its own treatment integrity checklist with between 12 and 30 items. The fidelity data indicated that most of the items had little to no variance with observers verifying that the items occurred during all or almost all observations (range of variance on these items = 90–100%). Two items showed the most variance: Does the lesson begin on time? (“yes” 73–86%) and in the DF, DCF, DCEF approaches: Do the learners respond as a group on signal? (61–71% “yes”). Areas needing improvement were continually addressed with teachers.

## RESULTS

For all analyses, raw scores were used. The decision to use raw scores was based on two primary reasons. First, because standard scores could not be calculated on some measures, and due to the age and performance levels of the participants, using only raw scores eliminated the confound of combining standard, scale, and raw scores in the analyses. Second, because the goal of the study was to examine response to a reading intervention over time, raw scores increase variability as well as help reduce floor effects.

Because of the stringent criteria that were used to define the final sample for data analyses, there were very little missing data (< 1%). Further, missing data were random across measures and time points. Our initial data analysis addressed outliers, atypical data scores, and unusual or problematic distributions that required transformation before analysis, or variables that would be needed to be included as covariates. In cases where deviations from normality were detected, appropriate transformations were made. However, when using transformations, the pattern of results concerning significance did not differ across these analyses. Therefore, analyses conducted with the original raw scores were retained for interpretation.

As can be seen in Table 2, the participants evidenced very poor skills. Mean standard and scale scores that were available for this age group, were at least 1 standard deviation below the mean on every measure, and scores were 2 standard deviations below the mean for measures assessing receptive vocabulary, phonological awareness, and oral reading fluency of words, nonwords, and connected text. Descriptive statistics for each of the study variables for each time point are shown in Tables 3–7.

### Correlation Analyses

In order to assess the strength of relationship among study variables, Pearson correlations were conducted within and across time points. Although the majority of correlations among reading-related measures were significant at the  $p < .001$  level, very few correlation coefficients were of the strength (i.e.,  $r > .60$ ) expected among the variables that would be seen in a sample of typically developing child readers at elementary school levels (e.g., Ehri, 1992; Landerl, Frith, & Wimmer, 1996). At the pretest time point, only two correlation coefficients were above .60. These are the correlation coefficients between the WJ Word Attack and TOWRE Phonemic Decoding Efficiency subtests ( $r = .71$ ) and between the TOWRE Sight Word Efficiency and GORT Fluency subtests ( $r = .66$ ). More importantly, however, the majority of the correlation coefficients (64%) were at or below .30; a level that represents small relationships. In addition, only four additional correlation coefficients were above .60 at the posttest time point: the correlation coefficients between WJ Letter Word Identification and WJ Word Attack subtests ( $r = .62$ ), WJ Fluency and TOWRE Sight Word Efficiency subtests ( $r = .68$ ), WJ Fluency and GORT Fluency subtests ( $r = .70$ ) and GORT fluency and TOWRE Sight Word Efficiency subtests ( $r = .72$ ). As with the correlations among the pretest variables, the majority (55%) of the correlations at the posttest time point were small (i.e.,  $\leq .30$ ).

Similar results were evidenced when pretest scores were correlated with posttest scores. Significant, but small to moderate (i.e.,  $r < .60$ ) correlations were seen among reading-related variables across time points. Correlations between the same subtests across time points (e.g., WJ Letter Word Identification pretest scores correlated with WJ Letter Word Identification posttest scores), however, were all significant and large (i.e.,  $> .60$ ), with one exception—the Comprehension subtest of the GORT ( $r = .35$ ). These results indicate that the participants' performance was basically reliable across assessment time points.

### Repeated Measures Analysis of Covariance

To determine whether significant gains were made across pretest, midpoint, and posttest time points independent of reading instruction group, repeated measures ANCOVAs collapsed across instructional group were conducted with the four subtests of the WJ as dependent variables and age as a covariate (because the WJ tests are standardized on the age of our participants, these tests were chosen as the measure of reading achievement; because standard scores were not used in our analyses, age was included as a covariate to assist in any possible age-related raw score impacts). Results indicated a significant main effect of time for all dependent variables,  $F(2, 392) = 10.44, p < .001, \eta^2 = .05$  (Letter Word Identification);  $F(2, 390) = 5.46, p = .005, \eta^2 = .03$  (Word Attack);  $F(2, 392) = 11.87, p < .001, \eta^2 = .06$  (Passage Comprehension); and  $F(2, 292) = 42.17, p < .001, \eta^2 = .18$  (Reading Fluency), with participants making significant gains in their scores across all reading instructional groups.

### Multivariate Analysis of Covariance

Due to the presence of both native language and ESL speakers, differences between reading instruction groups was initially evaluated by using a 2 (Native Language Status)  $\times$  5 (reading instruction group) Multivariate Analysis of Covariance (MANCOVA) technique, with posttest data serving as dependent variables. Dependent variables were grouped in sets by similarity of language or reading skill that was assessed. This resulted in three different MANCOVAs. The first MANCOVA was grouped by language skill and included the PPVT, BNT, and TOLD as dependent variables. The second MANCOVA, representing phonological awareness, utilized the Elision and Blending subtests of the CTOPP as dependent variables. The final MANCOVA was grouped by reading achievement and utilized the Letter Word ID, Word Attack, Reading Fluency, and Passage Comprehension subtests from the WJ, and the Fluency and Comprehension subtests of the GORT-IV.

In addition to pretest data for each of the dependent variables that was used, a core set of baseline covariates were used across all analyses. These covariates, based on their known conceptual importance in the literature of typical child reading development, were: age at entry into the study, number of hours of attendance, a composite measure of phonological awareness (i.e., the average of the Blending and Elision subtests from the CTOPP), the Sight Word Reading Efficiency and Phonemic Decoding Efficiency subtest of the TOWRE, and the PPVT.

Across all three MANCOVAs, only one significant finding was detected for instructional group. A significant difference among reading instruction groups was found with the dependent variables grouped by reading achievement,  $F(16, 708) = 2.49, p = .002, \eta^2 = .05$ . A follow up univariate ANCOVA indicated a significant difference among instructional groups for the Word Attack subtest,  $F(4, 177) = 4.93, p = .001, \eta^2 = .10$ . Tukey post hoc analyses indicated that significantly higher Word Attack scores ( $p < .05$ ) were evidenced by the C/C ( $M = 15.60$ ), DCEF ( $M = 17.15$ ), and DF ( $M = 17.98$ ) instruction groups than the ER instruction group ( $M = 11.36$ ).



Analyses revealed one significant finding for Native Language classification. A significant multivariate finding was detected for the dependent variables grouped by reading achievement,  $F(4, 174) = 2.42, p = .05, \eta^2 = .05$ . A follow up univariate ANCOVA revealed a significant main effect of ESL group for the Word Attack subtest of the WJ,  $F(1, 177) = 3.91, p = .05, \eta^2 = .02$ . Participants who learned English as a second language evidenced significantly higher post-test scores ( $M = 19.84, SD = 5.78$ ) than those who learned English as a first language ( $M = 11.49, SD = 6.28$ ).

In addition to posttest scores, a MANCOVA was also conducted for all measures administered at the six-month follow-up time point. Follow-up scores were available for 118 of the 198 participants. This subset of participants had a mean attendance of 94.4 ( $SD = 10.55$ ) hours and a mean age of 37.97 ( $SD = 13.32$ ). This group was made up of 37 males and 81 females with 69 reporting learning English as a second language. Sixty of the participants were African Americans, 5 were Caucasians, 37 were Hispanics, and 16 were Asians. With respect to reading intervention group, 26 participated in DF, 24 participated in DCF, 14 participated in ER, 36 participated in DCEF, and 18 participated in C/C.

The measures administered at the follow up time point allowed for one MANCOVA: a MANCOVA related to reading achievement (WJ Letter Word ID, Word Attack, Reading Fluency, Passage Comprehension, GORT Fluency, and Comprehension). The same pre-test covariates used for the posttest analyses were used for the follow-up analyses. No significant multivariate findings were detected for follow-up scores.<sup>2</sup>

## DISCUSSION

This study focused on adults who read single words at the 3.0 through 5.9 grade levels. As indicated in Table 2, their difficulties are apparent in all the processes and subprocesses studied, especially in the areas of receptive vocabulary, fluency, and phonological awareness. These findings add to the accumulating knowledge on the profiles of struggling adult readers. Their low receptive vocabulary skills make sense in light of vocabulary growth being connected to reading experience (Stanovich, 1986). Their difficulty with fluency is similar to difficulties described by Winn et al. (2006), and their poor phonological awareness is not surprising because this is the one area where more than a few studies have been conducted with reports of similar findings (e.g., Greenberg et al., 1997; Thompkins & Binder, 2003). Finally, similar to Greenberg et al.'s findings, correlation analyses indicate much lower than expected interrelationships among the reading and reading-related measures. These adults may be similar to children who have difficulty reading. Other researchers have commented on the poor integration of reading skills with children who read poorly (e.g., Ehri, 1997; Landerl, Frith, & Wimmer, 1996).

The primary goal of this study was to investigate which type of reading intervention or combination of reading interventions is the most effective in increasing the reading and reading-related skills of adults who read between the 3.0 and 5.9 word reading grade equivalencies. The primary hypothesis was that adults reading between the 3.0 and 5.9 grade levels would benefit from a combination of explicit and implicit instruction. Therefore, it was hypothesized that the DCEF condition would be more effective compared to all the other conditions. After attempting different types of analyses, the overall conclusion is that this hypothesis is not supported.

<sup>2</sup>In addition to the MANCOVA analyses, three-level HLM analyses were conducted for each of the four subtests of the WJ; participant scores nested in time, nested in instructional group, nested in reading instruction approach. No significant ( $p < .05$ ) Level-3 predictors were found.

Initially, in order to determine whether gains were made independent of instruction group, exploratory repeated measures collapsed across instructional group were conducted with the four WJ subtests as dependent variables. The sample in this study significantly improved their reading skills. These findings lend additional support to previous findings that adults can improve their reading skills in response to instructional programs (e.g., Gold & Horn, 1982; Gombert, 1994, Morais et al., 1988). However, it should be noted that the improvements noted are all associated with small effect sizes (from .03 to .18).

Next, a series of three MANCOVAs was conducted to take into account native language status and reading instruction group. Age, number of hours of attendance, and entry skills were all entered into models as covariates. Only one significant finding was detected for instruction group. The CC, DF, and DCEF instruction groups showed stronger word attack outcomes than the ER group. A MANCOVA was also conducted for all measures administered at follow-up testing and no significant findings were detected. Instruction approach did not significantly predict final scores or differentiate between reading instruction approaches with respect to change in scores over time.

The extent to which the hypotheses were not supported was surprising. The DF, DCF, and DCEF programs targeted the known weaknesses of adult struggling readers. Our lack of significant results is especially surprising when one considers that there are frequent mastery tests in the Corrective Reading Program and that the students showed mastery on these tests before moving to the next lesson. In addition, fidelity checks showed that teachers were implementing the lessons correctly. It is possible that the students did indeed progress (as indicated by the mastery tests), but their learning did not transfer to assessment battery performance. However, this does not explain why in published studies, children show notably more gain from these programs than the adults.

The Corrective Reading programs are based on what is known about remediation for children. It may be incorrect to assume that what is known about remediation for children completely applies to struggling adult readers. As evidenced by word reading grade equivalencies below the sixth grade, these adults are individuals who began to show difficulties at young ages; and therefore, as adults they may have difficulties that are entrenched and hard to remediate. In other words, perhaps these adults have so many years of unsuccessful education and “bad habits” that this is what differentiates them from children who also have difficulties but show significant gains from Corrective Reading. In support of this possibility, Nanda, Greenberg, and Morris (2010) described many difficulties that arise when trying to use child-based assumptions when developing measurement models for adults who struggle with reading.

Another possible reason for the lack of significant gain may be the lack of research on the validity and reliability of tests for struggling adult readers. Although, these tests have been standardized on typical adolescent/early adult/adult readers, they have not been similarly standardized on large groups of adults who read at elementary school grade levels. There are no tests similar to the tests used in this study that are specifically normed on struggling adult readers. In addition, some of the tests used in the battery are not normed for the ages included in this study (i.e., PIAT, TOWRE, CTOPP, and GORT). It is therefore unclear whether the tests used in this study are sensitive to change, or reliable and valid for adults who read single words between the 3.0 and 5.9 grade levels. For example, Greenberg, Pae, Morris, Calhoun, and Nanda (2009) described the complexities of understanding the results of GORT performance by struggling adult readers.

Reder's (2009) longitudinal study may yield some insights into the disappointing results. Over a six-year period, he did not find a relationship between adult literacy program

attendance and literacy gain; however, he did find a relationship between adult literacy program attendance and increased engagement in literacy practices. Most importantly, he found that increased literacy behavior eventually was related to greater skill. He therefore questions whether it is appropriate for programs to be measuring only skill gain, and suggests that changes in daily literacy behaviors should be measured as well. He writes: “Since we found positive correlations between rates of growth in proficiency and practices, it may be that these short-term impacts on practices will eventually mediate longer-term effects on proficiency development” (Reder, 2009, p. 81).

This study improves on the methodology of earlier studies by including a larger sample size, a longer stretch of instructional hours, discussion of attrition, and a detailed analysis of outcomes. One limitation of this study is that it is unknown how representative the sample is of struggling adult readers. Six hundred and twenty nine students qualified, but only 198 were exposed to the minimum number of hours required for the intervention analyses. Based on the data available, attrition analysis did not reveal differences of note. Another limitation is the inclusion criteria of non-native speakers. Non-native speakers were included if they were already either attending classes that were geared towards native English speakers, or were deemed appropriate by their current teachers as being ready to attend such classes. Further research should focus on testing different instructional approaches, constructing assessments for this population, establishing more rigorous inclusion criteria for native/non native status, and on studying literacy engagement practices. As Reder and Bynner (2009) indicate, further research is well worth the effort in terms of productivity, international competitiveness, civic participation, and health costs both for the individual and society.

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**Table 1**

Mean Number of Hours of Attendance at the Midpoint and Posttest Assessments by Reading Instruction Approach.

<b>Approach</b>	<b>Midpoint Mean</b>	<b>Midpoint SD</b>	<b>Posttest Mean</b>	<b>Posttest SD</b>
<b>C/C (n = 40)</b>	49.63	3.99	93.45	10.14
<b>DCEF (n = 49)</b>	49.24	2.57	93.94	10.80
<b>ER (n = 22)</b>	48.55	5.16	91.19	11.69
<b>DF (n = 46)</b>	49.71	2.73	93.83	10.33
<b>DFC (n = 41)</b>	51.14	2.46	96.15	8.91
<b>Total (n = 198)</b>	<i>49.74</i>	<i>3.34</i>	<i>93.97</i>	<i>10.28</i>

*Note.* C/C = Control/Comparison; DCEF = Decoding, Comprehension, Extensive Reading, and Fluency; ER = Extensive Reading; DF = Decoding and Fluency; DFC = Decoding, Comprehension, and Fluency.

**Table 2**

Means and Ranges of Language and Reading Measures Administered at the Pretest Time Point.

Assessment Measure	n = 277*	n = 256	n = 198
<b>Peabody Picture Vocabulary Test</b>	62.00 (40–94)	62.12 (40–94)	61.22 (40–94)
<b>Peabody Individual Achievement Test</b>	80.06 (55–113)	80.14 (55–113)	79.88 (55–113)
<b>CTOPP Elision</b>	3.08 (1–12)	3.08 (1–12)	3.05 (1–12)
<b>CTOPP Blending</b>	4.01 (1–12)	4.06 (1–12)	4.04 (1–12)
<b>CTOPP Rapid Letter Naming</b>	5.49 (1–12)	5.45 (1–15)	5.43 (1–15)
<b>WJ Letter Word ID</b>	77.03 (52–89)	77.26 (52–89)	77.61 (52–89)
<b>WJ Word Attack</b>	78.06 (33–98)	78.05 (33–98)	78.08 (33–98)
<b>WJ Fluency</b>	77.72 (58–100)	77.83 (58–100)	77.80 (58–100)
<b>WJ Passage Comprehension</b>	72.53 (21–93)	72.59 (21–93)	72.09 (21–93)
<b>TOWRE Sight Word Efficiency</b>	70.81 (55–90)	70.81 (55–90)	70.77 (55–90)
<b>TOWRE Phonemic Decoding Efficiency</b>	69.45 (55–100)	69.51 (55–100)	69.74 (55–100)
<b>GORT Fluency</b>	1.18 (1–8)	1.17 (1–8)	1.14 (1–3)
<b>GORT Comprehension</b>	2.56 (1–20)	2.61 (1–20)	2.56 (1–7)

*Note.* All reported scores are standard scores except for the CTOPP Elision, CTOPP Blending, CTOPP Rapid Letter Naming, GORT Fluency, and GORT Comprehension subtests. These scores are scaled scores with a  $M = 10$  and a  $SD = 3$ . Additionally, the norms used to compute the standard/scale scores for the Peabody Individual Achievement Test, TOWRE Sight Word Efficiency, TOWRE Phonemic Decoding, CTOPP Elision, CTOPP Blending, CTOPP Rapid Letter Naming, GORT Fluency, and GORT Comprehension do not include the age ranges of our participants. These scores, therefore, were computed with the following ages (as appropriate): PIAT-22 years; TOWRE- 24 years; CTOPP-24 years; GORT-18 years, which were the oldest ages in which these tests had normative data available.

\* 277 = the number of participants who attended through midpoint assessment; 256 = the number of participants who received posttest assessments, 198—the number of participants who met our minimal attendance requirement and therefore included in this data analysis.

**Table 3**

Mean and Standard Deviation of Language and Reading Measures Administered at the Three Time Points for the C/C Reading Instruction Group (n = 40).

Assessment Measure	Pretest	Midpoint	Posttest
<b>Peabody Picture Vocabulary Test</b>	116.18 (37.90)	na	121.23 (30.78)
<b>Peabody Individual Achievement Test</b>	65.53 (13.78)	67.00 (12.29)	66.68 (12.53)
<b>Boston Naming Test</b>	28.53 (11.30)	30.43 (11.89)	32.43 (11.47)
<b>Test of Oral Language Development</b>	8.10 (4.84)	na	8.52 (4.78)
<b>CTOPP Elision</b>	5.65 (2.89)	na	7.15 (3.95)
<b>CTOPP Blending</b>	7.00 (4.47)	na	7.22 (3.78)
<b>CTOPP Rapid Letter Naming</b>	37.57 (7.85)	na	35.45 (6.48)
<b>WJ Letter Word ID</b>	48.48 (4.60)	49.75 (7.02)	52.03 (6.83)
<b>WJ Word Attack</b>	12.97 (5.97)	16.35 (6.78)	15.60 (7.22)
<b>WJ Fluency</b>	33.97 (10.05)	36.40 (9.24)	39.50 (9.66)
<b>WJ Passage Comprehension</b>	21.67 (5.31)	22.95 (4.94)	23.92 (5.35)
<b>TOWRE Sight Word Efficiency</b>	58.82 (11.46)	57.15 (11.38)	61.13 (10.17)
<b>TOWRE Phonemic Decoding Efficiency</b>	20.62 (13.24)	19.55 (12.71)	22.13 (13.51)
<b>GORT Fluency</b>	38.55 (13.07)	35.43 (14.41)	40.00 (12.36)
<b>GORT Comprehension</b>	15.70 (13.25)	17.43 (11.03)	19.77 (14.98)

*Note.* All reported scores are raw scores (the CTOPP Rapid Letter Naming score is reflected in seconds).



**Table 4**

Mean and Standard Deviation of Language and Reading Measures Administered at the Three Time Points for the DCEF Reading Instruction Group (n = 49).

Assessment Measure	Pretest	Midpoint	Posttest
<b>Peabody Picture Vocabulary Test</b>	115.20 (31.91)	na	123.00 (29.39)
<b>Peabody Individual Achievement Test</b>	71.33 (13.51)	72.22 (12.26)	73.08 (12.92)
<b>Boston Naming Test</b>	29.55 (11.28)	31.63 (11.15)	34.53 (10.32)
<b>Test of Oral Language Development</b>	7.98 (5.23)	na	8.51 (5.32)
<b>CTOPP Elision</b>	7.20 (4.08)	na	8.14 (4.00)
<b>CTOPP Blending</b>	6.83 (3.70)	na	7.88 (4.05)
<b>CTOPP Rapid Letter Naming</b>	35.16 (9.46)	na	31.73 (7.89)
<b>WJ Letter Word ID</b>	49.67 (4.73)	51.18 (6.36)	52.02 (5.82)
<b>WJ Word Attack</b>	14.80 (6.65)	15.82 (6.78)	17.06 (6.90)
<b>WJ Fluency</b>	35.02 (9.12)	38.20 (8.89)	41.80 (11.45)
<b>WJ Passage Comprehension</b>	22.73 (5.04)	24.53 (4.80)	24.43 (5.22)
<b>TOWRE Sight Word Efficiency</b>	61.78 (8.90)	65.00 (9.00)	66.55 (8.61)
<b>TOWRE Phonemic Decoding Efficiency</b>	23.84 (14.15)	25.54 (15.52)	26.98 (12.63)
<b>GORT Fluency</b>	40.84 (12.22)	42.63 (15.01)	46.39 (13.72)
<b>GORT Comprehension</b>	19.04 (12.67)	16.76 (10.21)	24.16 (13.28)

*Note.* All reported scores are raw scores (the CTOPP Rapid Letter Naming score is reflected in seconds).

**Table 5**

Mean and Standard Deviation of Language and Reading Measures Administered at the Three Time Points for the ER Reading Instruction Group (n = 22).

Assessment Measure	Pretest	Midpoint	Posttest
<b>Peabody Picture Vocabulary Test</b>	120.77 (35.39)	na	129.82 (26.58)
<b>Peabody Individual Achievement Test</b>	66.77 (17.52)	68.82 (15.88)	72.23 (16.03)
<b>Boston Naming Test</b>	29.43 (11.87)	31.50 (11.50)	32.36 (11.50)
<b>Test of Oral Language Development</b>	6.36 (5.01)	na	5.82 (4.93)
<b>CTOPP Elision</b>	5.59 (2.28)	na	6.05 (2.63)
<b>CTOPP Blending</b>	5.73 (3.54)	na	6.27 (3.94)
<b>CTOPP Rapid Letter Naming</b>	36.18 (11.12)	na	36.23 (10.58)
<b>WJ Letter Word ID</b>	49.77 (4.47)	49.18 (7.68)	51.23 (6.99)
<b>WJ Word Attack</b>	12.50 (7.04)	12.14 (7.94)	11.36 (6.72)
<b>WJ Fluency</b>	38.18 (12.69)	38.77 (13.55)	41.59 (14.69)
<b>WJ Passage Comprehension</b>	21.95 (5.74)	22.77 (5.98)	22.36 (5.69)
<b>TOWRE Sight Word Efficiency</b>	61.55 (13.91)	62.09 (13.55)	63.50 (12.15)
<b>TOWRE Phonemic Decoding Efficiency</b>	23.86 (13.46)	22.18 (14.11)	24.19 (14.66)
<b>GORT Fluency</b>	38.59 (15.30)	38.23 (18.11)	41.00 (15.43)
<b>GORT Comprehension</b>	10.82 (14.33)	15.95 (11.97)	22.00 (14.02)

*Note.* All reported scores are raw scores (the CTOPP Rapid Letter Naming score is reflected in seconds).

**Table 6**

Mean and Standard Deviation of Language and Reading Measures Administered at the Three Time Points for the DF Reading Instruction Group (n = 46).

Assessment Measure	Pretest	Midpoint	Posttest
<b>Peabody Picture Vocabulary Test</b>	107.83 (37.33)	na	110.00 (38.10)
<b>Peabody Individual Achievement Test</b>	66.46 (15.73)	68.43 (15.83)	68.52 (15.39)
<b>Boston Naming Test</b>	24.17 (12.55)	25.99 (12.31)	28.24 (13.05)
<b>Test of Oral Language Development</b>	6.22 (4.07)	na	7.28 (3.80)
<b>CTOPP Elision</b>	6.41 (3.58)	na	7.83 (4.10)
<b>CTOPP Blending</b>	6.70 (3.93)	na	8.54 (4.37)
<b>CTOPP Rapid Letter Naming</b>	32.76 (7.36)	na	31.41 (7.04)
<b>WJ Letter Word ID</b>	50.41 (5.08)	49.67 (7.13)	52.98 (7.65)
<b>WJ Word Attack</b>	16.11 (6.58)	16.60 (6.65)	17.98 (6.99)
<b>WJ Fluency</b>	33.89 (9.00)	36.48 (10.48)	40.46 (10.61)
<b>WJ Passage Comprehension</b>	20.70 (4.98)	23.41 (4.75)	21.96 (5.10)
<b>TOWRE Sight Word Efficiency</b>	62.89 (10.95)	32.56 (11.81)	66.20 (12.15)
<b>TOWRE Phonemic Decoding Efficiency</b>	27.41 (12.75)	24.69 (12.06)	28.46 (13.36)
<b>GORT Fluency</b>	39.52 (13.93)	38.09 (17.75)	40.56 (14.06)
<b>GORT Comprehension</b>	12.07 (13.45)	15.04 (11.20)	19.00 (13.97)

*Note.* All reported scores are raw scores (the CTOPP Rapid Letter Naming score is reflected in seconds).

**Table 7**

Mean and Standard Deviation of Language and Reading Measures Administered at the Three Time Points for the DCF Reading Instruction Group (n = 41).

Assessment Measure	Pretest	Midpoint	Posttest
<b>Peabody Picture Vocabulary Test</b>	113.90 (34.99)	na	120.59 (28.90)
<b>Peabody Individual Achievement Test</b>	71.49 (12.86)	72.17 (12.27)	74.49 (13.21)
<b>Boston Naming Test</b>	24.77 (10.43)	28.59 (10.55)	32.20 (9.64)
<b>Test of Oral Language Development</b>	5.78 (3.82)	na	7.02 (3.74)
<b>CTOPP Elision</b>	6.95 (5.00)	na	8.73 (5.02)
<b>CTOPP Blending</b>	6.46 (4.33)	na	8.20 (4.06)
<b>CTOPP Rapid Letter Naming</b>	34.54 (9.21)	na	32.51 (7.32)
<b>WJ Letter Word ID</b>	50.80 (4.45)	50.37 (7.17)	51.39 (7.13)
<b>WJ Word Attack</b>	14.68 (7.16)	16.34 (7.33)	16.00 (7.61)
<b>WJ Fluency</b>	35.68 (8.55)	40.37 (9.87)	43.83 (11.35)
<b>WJ Passage Comprehension</b>	21.37 (4.77)	22.49 (4.20)	23.00 (5.20)
<b>TOWRE Sight Word Efficiency</b>	62.24 (12.17)	62.29 (11.38)	65.80 (9.70)
<b>TOWRE Phonemic Decoding Efficiency</b>	25.07 (16.13)	26.95 (13.78)	28.46 (15.52)
<b>GORT Fluency</b>	38.29 (11.31)	40.02 (16.53)	42.78 (13.22)
<b>GORT Comprehension</b>	15.15 (10.73)	11.80 (8.21)	19.76 (13.26)

*Note.* All reported scores are raw scores (the CTOPP Rapid Letter Naming score is reflected in seconds).