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Relation and interactions among reading fluency and competence for adult education learners

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Abstract

Statistical analyses of data from an academically diverse sample of 276 adult basic and secondary education learners extends understanding of the relation of and interactions between oral reading fluency and reading competence indices. Significant interactions between total word rate and word error rate that differed in relation to two measures of reading competence suggest that adult literacy instructors should emphasize fluency instruction to a greater or lesser degree depending on whether the major goal of instruction is academic reading (e.g., being able to comprehend a textbook) or functional reading (e.g., being able to fill out a job application).

Keywords

fluency; adult education

The Partnership for Reading—comprised of the National Institute for Literacy (NIFL), the National Institute of Child Health and Human Development (NICHD), and the U.S. Department of Education (USDE) and Department of Health and Human Services (DHHS)—recommended reading fluency as one of the five instructional foci in adult basic and secondary education (ABE/ASE; Kruidenier, 2002). A reasonable basis for such a recommendation is found in research with younger learners, which confirms the significant correlation of oral reading fluency (ORF) and reading comprehension (e.g., Calfee & Piontkowski, 1981; Fuchs, Fuchs, Hosp, & Jenkins, 2001; Pinnell, Pikulski, Wixson, Campbell, Gough, & Beatty, 1995; Stanovich, 1986). Further, the idea that ABE/ASE students could benefit from increased fluency is supported by a few studies of ORF among the ABE/ASE target population (McKane & Greene, 1996; Meyer, 1982) that suggest oral reading practice (e.g., repeated reading, guided oral reading, independent reading) may lead to increased reading achievement. However, adult literacy research provides minimal empirical evidence to support the recommendation (Kruidenier, 2002). In fact, some researchers have posited that "repeated readings, by itself, is insufficient to address the rapid processing of the multiple systems comprising fluency" (Foorman & Mehta, n.d., p. 12).

Our recent study of ABE/ASE learner fluency in relation to reading component skills found that individuals who read with comparable correct word rates varied significantly in their rates of total words read and word error rates (Mellard, Woods, & Fall, 2011a). Four groups based on similar total word and word error rates among this academically diverse group of learners had significantly different component skill profiles from one another. Moreover, each group included learners from several different ABE/ASE placement levels, which are

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made on the basis of an assessment of overall reading competence. One implication of these findings is that approaches to fluency instruction may best be differentiated on the basis of learners' total word and word error rates, rather than on their ABE/ASE instructional level or overall reading competence. However, the previous study did not test for the presence of significant interactions between reading speed and accuracy, which potentially could contribute to a better understanding of how fluency relates to reading competence in this population and development of differentiated fluency instruction for ABE/ASE learners.

Fluency Theories and Research

A variety of theories and approaches to understanding fluency exist in research on childhood reading acquisition. Some theories emphasize efficient word recognition, which accounts for nearly all of the reliable variance in reading ability, as the most important sub-skill for fluent reading (e.g., Hoover & Gough, 1990; Nathan & Stanovich, 1991; Torgesen, Wagner, & Rashotte, Burgess, & Hecht, 1997; Vadasy, Sanders, & Peyton, 2005). For example, the limited capacity theory of reading suggests inefficient word recognition processes can unduly drain cognitive resources and thus contribute to a lack of fluency and poor reading comprehension (Perfetti, 1985). Educators operating from this perspective view the number of words correctly read per minute as "an elegant and reliable way to characterize expert reading" (Fuchs, Fuchs, Hosp, & Jenkins, 2001, p. 240) because it reflects a reader's ability to quickly coordinate multiple reading skills.

Other theories of reading fluency take a multidimensional approach, wherein variance in fluency is viewed as the combined result of several individual reading sub-skills rather than attributing the shared variance in fluency scores to word reading alone (e.g., Catts, Gillispie, Leonard, Kail, & Miller, 2002; Katzir et al., 2006; Manis, Doi, & Bhada, 2000; Miller et al., 2006; Wolf & Katzir-Cohen, 2001). Some models of fluent reading also incorporate the external effects of text type (e.g., narrative vs. expository) and difficulty (e.g., Torgesen, Rashotte, & Alexander, 2001; Verhoeven & Perfetti, 2008), and/or underlying cognitive constraints inherent to the readers (e.g., working memory; Berninger, Abbott, Billingsley, & Nagy, 2001). Further, some theories of reading fluency emphasize prosody as the bridge to comprehension (e.g., Allington, 1983; Dowhower, 1991; Pikulski & Chard, 2005; Pinnell, et al., 1995; Rasinski, 2010; Schreiber, 1991), while others consider the relation between prosody and comprehension unsettled and possibly reciprocal (Kuhn, Schwanenflugel, & Meisinger, 2010). Despite the existence of these many theories and models, fluency instruction for children most often takes the form of guided repeated oral reading procedures (NICHD, 2000), with little differentiation based on specific skill deficits.

Adult Learner Differences

Adults with low literacy developmentally and experientially differ from young readers, among whom most reading fluency research has been conducted. As children learn to read, they increase in cognitive processing speeds for developmental reasons, regardless of how much schooling they are acquiring; in contrast, adults' cognitive processing speeds reach a plateau between 18 and 35 years of age (Kail & Salthouse, 1994) and decline thereafter. Thus, the strong connection between reading speed and improved reading ability or comprehension observed in children may be artifactual and not hold for adults with low literacy. Conversely, Sabatini's (2002) study of adults with low literacy identified a significant connection between word recognition ability and speed of processing. Similarly, Chiappe, Stringer, Siegel, and Stanovich's (2002) study of adult readers found both phonological processing and naming speed contributed unique variance to word reading; however, they speculated that variance in naming speed was likely to be a reflection of problems with phonological processing. Strucker, Yamamoto, and Kirsch's (2007) study of

adult literacy program participants, including English language learners, also identified the importance of reading rate and accurate decoding to good reading comprehension.

Another difference between children and adults learning to read is life experience that contributes to prior knowledge and vocabulary. Depending on the content of a text, knowledge and vocabulary may aid word recognition, and thus fluency and reading comprehension. Adult experiences may, however, also include habitual use of inappropriate, awkward or obstructive reading behaviors that can slow reading rate or reduce word reading accuracy and hinder fluency and comprehension. For example, an adult may routinely guess at words based on graphic similarity (e.g., saying "progress" when text is "precious") or context cues (e.g., saying "the teacher, *Mrs*. Lopez, attended the conference" when text is "the teacher, *Mr*. Lopez, attended the conference"; or even insert or overlook punctuation in ways that change meaning (e.g., saying "Augie quit saying he was looking for another job" when the text is "Augie quit, saying he was looking for another job" [O'Conner, 1996]).

Adults with poor ORF and literacy skills are not confined to those who enroll in adult education programs. The National Assessment of Adult Literacy (NAAL) fluency assessment describes ORF among the U.S. adult population across a wide range of proficiencies (Baer, Kutner, Sabatini, & White, 2009), including passage reading rates (words correct per minute; wcpm) for different levels of reading competency. For the 14% of American adults with the lowest levels of prose reading competency—Below Basic—the NAAL reports five subgroups with average passage reading rates ranging from 53 wcpm (*SE* = 2.6) to 113 wcpm (*SE* = 1.7). Twenty-nine percent of adults have Basic prose reading competency and average 143 wcpm (*SE* = 0.9); 44% are classified as Intermediate readers who average 166 wcpm (*SE* = 0.7); and 13% are Proficient readers with an average 178 wcpm (*SE* = 0.8) passage reading rate.

Adult education learners' fluency

In our previous study of ABE/ASE learners (Mellard et al., 2011a), the four groups formed on the basis of total word and word error rates were distinct from one another in multiple underlying abilities that contribute to reading ability (i.e., intellectual ability, phonemic awareness, processing speed, listening, memory) as well as in knowledge or performance directly related to reading (i.e., vocabulary, word-level skills, comprehension). These differences remained even after we statistically controlled for differences in general intellectual ability. In addition, a dominance analysis of ORF among these same ABE/ASE learners (Mellard, Anthony, & Woods, 2011b) found that word reading accuracy and efficiency were, in fact, the best predictors of ORF. This analysis also found that vocabulary and auditory working memory contributed to or constrained ORF.

Purpose of the Present Study

Given the call for more attention to ABE/ASE fluency instruction as well as the academic and skill diversity among ABE/ASE learners, we sought to better understand: What is the relation between oral reading rate and accuracy and their interaction? and How does their interaction relate to reading competence? We, therefore, statistically explored the relation and interactions among total word rate and word error rate, and two reading competence indices for 276 ABE/ASE learners. The two reading competence indices represent: (a) functional reading, which is the immediate competence goal for beginning level ABE/ASE learners and (b) passage comprehension, which is more aligned with the reading competence needed for an ABE/ASE secondary learner to earn a General Educational Development (GED) high school equivalency certification.

Method

We designed an exploratory analysis of primary research data collected in the context of a larger study of adult literacy learners. Standard multiple regression analyses identified the contributions of independent variables representing oral reading speed and word error rate to variance in two reading competence indices. Because significant interactions existed between total word rate and word error rate for both indices, we then examined the region of significance and its directionality as an indication of the skill level at which a reader's speed and word errors work together to hinder or advance reading competence.

Sample

Research staff collected data from individuals enrolled in 13 Midwestern *Adult Education and Family Literacy Act* of 1998 (Title II of P.L.105-220) programs. Participants had to be at least 16 years old; withdrawn from secondary education without earning a secondary credential or without attaining basic reading, writing or math skills; and, in order to receive a nominal participation payment, a U.S. citizen or authorized to work in the U.S. as a foreign national. Because this study addressed literacy and not language differences, we excluded all English language learners enrolled in English as a Second Language (ESL) courses. Non-native English speakers who were sufficiently proficient in English to be enrolled in non-ESL courses were retained in the sample population.

Sampling method—Non-ESL learners were classified into the USDE National Reporting System's (NRS) six educational functional levels (USDE, 2004) based on *Comprehensive Adult Student Assessment System* (CASAS, 2001) reading diagnostic scores. These levels are referred to as Level 1, Adult Basic Education (ABE) Beginning Literacy; Level 2, Beginning ABE; Level 3, Low Intermediate ABE; Level 4, High Intermediate ABE; Level 5, Low Adult Secondary Education (ASE); and Level 6, High ASE.

For each of the three highest educational functional levels—Levels 4, 5, and 6—we randomly selected a sample for a total of approximately 60 learners per level. Although our intention was to use this sampling method with the three lowest levels, too few lower level learners volunteered for the study. Therefore, we used a convenience sample that included all eligible volunteers in Levels 1, 2, and 3, up to a total of 60 per level.

Three hundred and thirty eligible learners were selected for the study. Eleven of these learners refused to participate after initially agreeing to take assessments, most commonly due to stated lack of time. We eliminated 30 participants' data because of incomplete information. Finally, we excluded another 13 learners who participated in the assessments, but for whose data we had validity concerns (e.g., statistical outliers, cognitive disability such as traumatic brain injury). Therefore, we present analysis on a total sample of 276 learners distributed by educational functional level as follows: Level 1 $n = 20$; Level 2 $n = 42$; Level 3 $n = 52$; Level 4 $n = 52$; Level 5 $n = 56$; Level 6 $n = 54$.

Demographic characteristics—The participants were 60% female ($n = 167$), which is typical of ABE/ASE populations, nationally and in the state where participants lived (USDE, 2005; Glass, 2007). Participants ranged in age from 16 to 73 years, with a median age of 24 years—also typical of ABE/ASE learners. The participants' race/ethnicity was representative of the study region's non-ESL, ABE/ASE participants with 39% White Non-Hispanic ($n = 108$), 34% African American ($n = 95$), 10% White Hispanic ($n = 28$), 17% Other or Not reported ($n = 45$).

Intellectual and reading abilities—Table 1 presents standard scores for general intellectual and reading abilities by NRS educational functional level for the sample. A

composite of *Wechsler Adult Intelligence Scale III* (WAIS; Wechsler, 1997) Block Design, Information, and Vocabulary assessments referred to as pro-rated IQ (Sattler, 2001) revealed a below average general intelligence for the sample (M = 81.9; SD = 12.5). The sample averaged about a 4th grade reading level as illustrated by following standard scores from the *Woodcock Reading Mastery Tests-Revised* (WRMT-R; Woodcock, 1998) subtests: Word Attack M = 78.7 (SD = 19.1), Word Identification M = 71.8 (SD = 19.9), and Passage Comprehension M = 73.4 (SD = 22.0). The sample's ORF averaged total words per minute M = 116.5 (SD = 46.4) and word error rate M = 9.4 (SD = 5.6), for an average correct word rate of 107 words.

Instruments

Independent variables—We created an informal assessment for measuring oral reading fluency using two 6th grade reading level passages with Lexile® scores of 660L and 710L from the Qualitative Reading Inventory-3 (QRI; Leslie & Caldwell, 2001). Participants read aloud each passage for one minute while examiners unobtrusively counted word errors and marked the last word read in the allotted time to indicate total words read. Figure 1 lists our error scoring criteria. Scores are presented as the mean of the two trials. Study data indicate alternate form reliability of the measure of .94 for total words and correlation of .78 for word errors with Test of Silent Word Reading Efficiency (Mather, Hammill, Allen, & Roberts, 2004).

The literature suggested several options for independent variables—total words read, word errors, words correct, and the interactions between these measures. We chose total words rate (TWR) rather than correct words, the typical measure of ORF, because words correct are not independent of word errors. A post hoc sequential regression analysis of passage comprehension variance, using forward entry to control for word error rate (WER), compared the relative weights of WER and words correct rate (WCR) versus WER and TWR (Table 2). Although the models with different predictors accounted for the same amount of variance (Adj. R^2 = .683), the TWR model placed greater weight on WER (β_{TWR} = −.261 vs. β_{WCR} = −.175), supporting our assertion that the total word rate variable would be more informative because the measure shared less variance with WER. Thus we conducted our multivariate regression analyses using TWR rather than WCR as the second independent variable.

We further opted to include and examine an interaction variable between TWR and WER to avoid a non-interaction seeking bias that could lead to interpretational errors (Onwuegbuzie & Daniel, 2003) and gain a deeper understanding of fluency in relation to reading competence. To create this interaction variable we first centered the TWR and WER variables to reduce issues of multicollinearity (Aiken & West, 1991), and then multiplied the two centered variables (Tabachnick & Fidell, 2007) to obtain the resulting interaction variable ($I_{TWR\text{-}WER}$).

Dependent variables—We drew our two dependent variables from the battery of 14 standardized tests and subtests used in our broader study of adult education participants. First, the Woodcock Reading Mastery Tests-Revised (WRMT-R) passage comprehension subtest (Woodcock, 1998) provided a measure of subjects' abilities to read and comprehend short passages of two to three sentences using a cloze procedure. This assessment requires subjects to use skills like those required to pass the GED or score well on the NAEP—especially drawing inferences (Author, 2005). Second, the Comprehensive Adult Student Assessment System (CASAS, 2001), which was developed for adults with low skill levels, provided scores for functional literacy competencies related to workplace and survival needs, such as reading technical manuals, tax forms, or prescription labels. This assessment

requires subjects to use such skills as looking for clues and generating questions as they read (Author, 2005).

Both of these assessments are generally accepted as reliable and valid measures of reading skills. The WRMT-R (Woodcock, 1998) has an internal reliability of .87 – .98, and a concurrent validity of .79 – .92. The CASAS (2001) internal consistency values are reported as ranging from .88 – .92 and validity and strong psychometric properties as reported by Flowerday (2005).

Procedures

Assessment administration—Graduate research assistants trained to criterion on all instruments individually administered the assessment battery to each subject at the ABE/ASE sites. Participants received a $50 participation payment when they completed the assessment battery, which took from 4 to 5 hours to complete. Examiners completed a procedural validity checklist for each participant to ensure complete administration of the test battery; a data handling team followed a protocol for ensuring the records were complete and accurate, including inter-rater reliability and validity checks.

Statistical analyses—To provide a cursory view of this sample's ORF across the levels of adult education categories, we developed a scatter plot of TWR and WER. Using median scores of TWR and WER as markers, one fifth of the sample read below both the median TWR and the median WER, suggesting they are slower but more accurate than other readers in the sample. We ran multiple regression analyses with each dependent variable to predict the relative contributions of TWR, WER, and $I_{TWR\text{-}WER}$.

To better understand the interaction between TWR and WER for each dependent variable (the two competence indices), we projected 2-way interaction lines from covariance matrices between TWR and dependent variables for mean WER and for WER levels one standard deviation above and below the mean. We further probed these interactions to examine at their regions of significance, and their directionality (Aiken & West, 1991; Preacher, Curran, & Bauer, 2006) by plotting the slopes of the interaction lines and identifying the WER level at which they had no effect on the dependent variable outcome, that is, the level at which the interaction line slope equaled zero.

Findings

In general, we found that among this sample of adult education learners, oral reading rate and accuracy indices and their interaction provided insights into the role of fluency in adult reading competence. In particular, we found significant interactions between TWR (total word rate) and WER (word error rate) that differed in relation to passage comprehension and functional reading.

The ORF of this sample was a mean TWR of 116.5 (SD = 46.4), a WER of M = 9.4 (SD = 5.6), and the resulting WCR of 107, which would be described in NAAL terminology as having Below Basic fluency skills (Baer et al., 2009). Alternatively, this performance level might be interpreted as ORF equivalent to a 3rd grader or low-skilled 4th grader (Adams & Brown, 2004; Hasbrouck & Tindal, 1992; Rasinski, 2003).

The scatter plot of individual TWR and WER scores (Figure 2) shows that the sample's fluency patterns are more diverse than a WCR metric alone would communicate. A median split of the sample on TWR and WER shows 33% of the sample read slowly and inaccurately, 19% read slowly and accurately. About 12% of the sample read more rapidly, but inaccurately, and 29% read rapidly and accurately compared to others in this sample. We

hesitate to refer to this last group of relatively rapid and accurate readers as normal adult readers because most of this group had lower WCR than expected for 9th to 12th grade readers (e.g., 180 and 200 WCR; Adams & Brown, 2004; Hasbrouk & Tindal, 1992) or an average proficient reader in the NAAL fluency assessment (M = 178 WCR; Baer et al., 2009).

Interaction between fluency indices and passage comprehension—Multiple regression analysis demonstrated a significant interaction between TWR and WER for passage comprehension at every level of WER above −19, or in effect, for all levels of WER (Figure 3). Furthermore, TWR, WER, and $I_{TWR\text{-}WER}$ accounted for .689 of variance in passage comprehension (see Table 3). The 2-way interaction plot (Figure 3) indicated a linear relationship between TWR and passage comprehension. However, the level of WER directly affected this relationship as evidenced by the interaction slopes at different levels of WER. Another way of saying this is that word errors have a more punitive effect on slower readers' passage comprehension than on faster readers' comprehension, which is what we typically expect with young readers.

Interaction between fluency indices and functional reading—Multiple regression analysis also indicated a linear relationship between TWR and functional reading at every level of WER less than 24, which included 98% of the readers in our sample (Figure 3). TWR, WER, and $I_{TWR\text{-}WER}$ accounted for .549 of variance in functional reading (see Table 3). As with passage comprehension, the 2-way interaction plot (Figure 3) indicated a linear relationship between TWR and functional reading level. However, the level of WER disordinally affected the relation of TWR to functional reading. For extremely slow readers (i.e., less than 40 TWR), WER were less deleterious to functional reading, and for faster readers WER were greatly detrimental to functional reading. This pattern is different from what is typically expected of the relationship between word reading skill and comprehension.

Discussion

Our exploration of the role of oral reading fluency in reading competence among adult education participants identified significant interactions between total word rate and word error rate that differed in relation to passage comprehension and functional reading. Recall that our passage comprehension measure was an untimed, cloze task from the *Woodcock Reading Mastery Tests-Revised* (Woodcock, 1998), and our functional reading measure presented readers with multiple-choice items from the *Comprehensive Adult Student Assessment System* (CASAS, 2001) reading test. Not surprisingly, on our passage comprehension measure the slower reading adults with lower word error rates had an advantage over slower readers with higher word error rates, and the effect of the error rate lessened as total words read increased. However, with functional reading competence, word errors were less harmful to slower readers and were more harmful to faster readers. This reversal might reflect the challenges of comprehending text under these different task demands and the associated demands on working memory and verbal reasoning required by the functional reading assessment.

Clearly with passage reading tasks, every word error has a proportionally larger negative effect on comprehension for slower readers than faster readers. However, we suspect that faster readers also have an advantage from more total words because the correct words provide more context cues to accumulate in working memory and to be drawn upon for forming associations, recalling information, and verbal reasoning, and thus, better comprehension. However, in measures of functional reading (completing a form, following directions, etc.), faster readers may not be able to compensate for word errors with context

cues and verbal reasoning. Indeed, with the same sample of low literacy adults we created a path model of reading comprehension that indicated significant roles for working memory, language comprehension and vocabulary (Mellard, Fall, & Woods, 2010). Likewise, dominance analysis of fluency among this sample demonstrated more than expected importance of working memory and vocabulary (Mellard et al., 2011b).

Implications for Instruction

Instructional implications for these findings clearly indicate that an adult literacy instructor might emphasize fluency instruction to a greater or lesser degree depending on the learner's current rate and accuracy patterns. The distinction is even more important depending on the whether the major goal of instruction is academic reading (e.g., being able to comprehend a textbook) or functional reading (e.g., being able to fill out a job application).

For example, instructional programs like *Extensive Reading* (Greenberg, Rodrigo, Berry, Brinck, & Joseph, 2006; Rodrigo, Greenberg, Burke, et al., 2007), which places less emphasis on single word recognition, vocabulary, and sentence construction and encourages readers to ignore or guess words they do not know, may be appropriate for developing fluency for readers with the academic reading goals. Strategic instruction to develop vocabulary and verbal reasoning, and better use of working memory may also be important to increasing ORF for learners with academic reading goals.

Conversely, learners with primarily functional reading goals may benefit from such instructional programs as *Corrective Reading* (Englemann, 1999), which is a highly systematic and sequenced program where 80–90% of instructional time is devoted to decoding and word recognition, with the remaining time emphasizing oral reading rate. This program will more likely increase the learners' reading component skills that would increase fluency and reading component integration, though perhaps at a slower rate.

Limitations

This study does not address typical reading development in adults, rather it examines reading skills among adults withdrawn from secondary education without earning a secondary credential or without attaining basic reading, writing or math skills. Further, the sample represents those adults with low literacy who exhibited a motivation to improve their literacy or earn a GED. Thus, our findings should be most applicable to adult remedial education settings and not necessarily applicable for all adults in general learning environments.

Our intentional decision to measure ORF using passages at a single reading level rather than a reader's comprehension level provided a form of comparability among readers. Results cannot be strictly interpreted as one might in a diagnostic reading inventory, which would evaluate readers only up to a frustration level of errors or an overall comprehension level. In addition this analysis does not address issues pertaining to the prosody dimension of fluency.

Conclusion

Our analysis of 276 ABE/ASE learners' oral reading fluency and its relation to reading competence identified significant interactions between total word rate and word error rate that differed in relation to passage comprehension and functional reading. When presented with passage comprehension tasks, the effect of word error rate lessened for adults who read more total words. However, when presented with functional reading tasks, the effect of word error rate increased for adults who read more total words. By understanding these interactions among total word rate, word error rate and the goal of a reader or the target

literacy task, more beneficial curriculum and instruction may be developed for adult literacy learners.

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Additions	if reader adds words to the passage or adds a letter to the end of a word, count as an error
Omissions	if reader omits entire word, count as an error
Self-corrections	if reader says word wrong and then corrects him or herself, count one error and one correct
Repetitions	if reader says word correctly then rereads correctly, count only the first reading as correct and each repetition of the word as an error
Mispronunciations	if reader mispronounces a word, count as an error each time it is read *except* when mispronunciation is a plausible pronunciation of a proper noun, which is then counted as correct

Figure 1.
Error scoring criteria

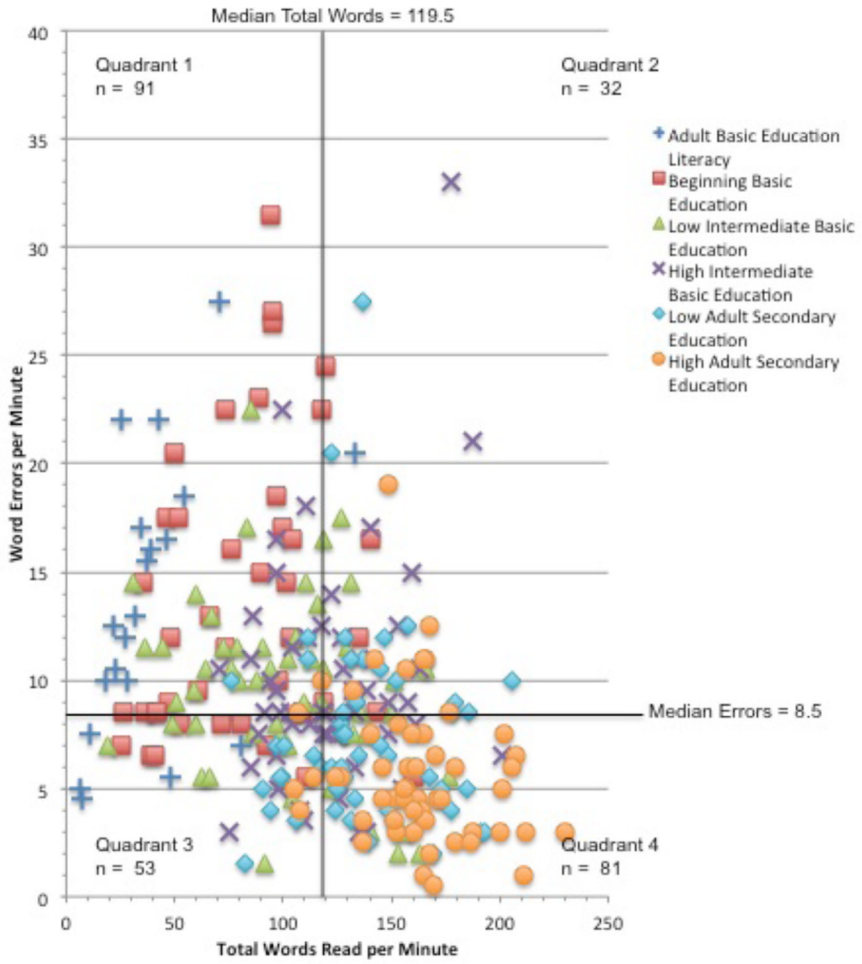

Figure 2.
Scatter plot of Total Word Rate by Worde Error Rate and adult education level

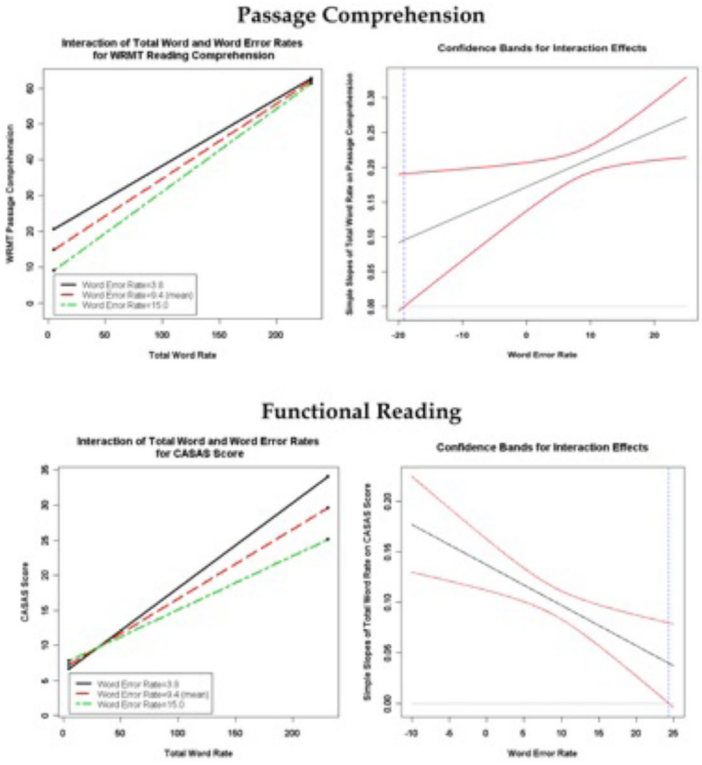

Figure 3.
Interaction of Total Word and Word Error Rates for WRMT Reading Comprehension and for CASAS Scores

Table 1

Standard Scores by NRS Educational Functional Level for Sample Reading Skills and IQ

Educational functional level	*n*	WRMT-R Word Attack	WRMT-R Word Identification	WRMT-R Passage Comprehension	WAIS pro-rated IQ	Passage oral reading fluency (words correct rate)
Level 1 mean *(SD)*	20	45.7 (16.4)	39.6 (14.1)	36.7 (16.7)	69.2 (6.8)	25.6 (26.9)
Level 2 mean *(SD)*	42	64.3 (15.5)	51.9 (16.9)	53.6 (17.8)	72.7 (6.5)	67.3 (34.0)
Level 3 mean *(SD)*	52	75.8 (16.0)	67.6 (16.5)	67.5 (17.2)	78.8 (11.2)	90.0 (38.8)
Level 4 mean *(SD)*	52	80.4 (13.3)	73.3 (11.3)	77.5 (11.3)	80.3 (8.2)	112.0 (28.1)
Level 5 mean *(SD)*	56	88.6 (12.0)	82.4 (10.3)	81.7 (14.8)	85.3 (10.2)	130.3 (30.1)
Level 6 mean *(SD)*	54	93.0 (11.7)	90.7 (8.3)	95.4 (9.5)	95.0 (12.2)	155.7 (28.8)
Total mean *(SD)*	276	78.7 (19.1)	71.8 (19.9)	73.4 (22.0)	81.9 (12.5)	107.1 (48.4)

Table 2

Comparative Regression Models of Reading Comprehension, Controlling for Word Errors: Total Words vs. Words Correct (N = 276)

Independent variables	*B*	*SE B*	β
Words correct rate model			
Intercept	20.522*	1.658	
Word error rate	−.406	.087	−.175*
Words correct rate	.200	.010	.740*
Adjusted R^2 = .683	F = 296.955*		
Total word rate model			
Intercept	20.522*	1.658	
Word error rate	−.606	.083	−.261*
Total word rate	.200	.010	.709*
Adjusted R^2 = .683	F = 296.955*		

* $p < .01$