

Reading on the Ropes: A Pilot Study of an Accelerated Remediation Program with Alternative High School Students

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Abstract

High school students must read to learn curriculum, yet few interventions are proven to substantially help close literacy gaps for older students with reading deficits. Students with large literacy deficits particularly benefit from explicit, systematic instruction of interventions emphasizing the structure of language (i.e., phonology, orthography, syntax, morphology, semantics, pragmatics), aspects of cognition (i.e., problem solving, attention, reasoning, and inferencing), and organization of spoken and written language.

A 14-week pilot study of Readable English, a reading intervention using these structured literacy elements, provided embedded interactive orthography to scaffold online grade level content for students at two alternative high schools ($N = 25$). Students in the treatment group showed significant and meaningful increases in standardized tests of reading accuracy, fluency, and reading comprehension compared to minimal or no gains in the control group. Transfer effects from students using the Readable English markup to reading in standard English were demonstrated. Implications for use as accelerated remediation intervention for older adolescents are discussed.

Keywords: adolescent literacy, instruction, reading disability, fluency, comprehension

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Decades of reading research confirm that interventions with a structured, explicit, systematic, multisensory approach to instruction, known as structured literacy, offer the best path forward for students with literacy deficits who have been left behind their same-age peers (Moats, 2020). Instruction based on the tenets of structured literacy emphasize the structure of language, the organization of spoken and written communication, and aspects of cognition such as problem solving, attention, reasoning, and inferencing skills. To read and understand words on a page, students require explicit instruction that emphasizes phonology (the speech sound system), orthography (the writing system), syntax (the structure of sentences), morphology (meaningful word parts), semantics (word meanings), and pragmatics (comprehension) (Boudah, 2018; Edmonds et al., 2009). Older adolescents receiving comprehensive, explicit and systematic instruction using these mutually supportive skills usually experience significant improvement in literacy deficits (see Collins et al., 2020; Lovett, et al., 2000; Tighe & Schatschneider, 2016).

Although reading research clearly demonstrates the need for structured literacy instruction, many American elementary students do not receive appropriate reading instruction and do not read on grade level (Gabriel, 2018; Moats, 2019). As a result, only 34% of eighth graders and 37% of twelfth graders are proficient readers as measured by the National Assessment of Educational Progress (NAEP) (National Center for Education Statistics, 2019). High school students, however, must be able to read to learn new course content. Students who are not proficient readers by high school have read many millions of words less than proficient same-age readers (Stanovich, 2009). Insufficient reading practice necessary to achieve the

requisite automaticity and fluency for accessing complex high school text, as well as lack of exposure to rare vocabulary further hinder reading comprehension (Moats, 2020). Because vocabulary is largely learned through reading in context, adolescent readers who have difficulty reading frequently do not develop vocabulary needed to comprehend course material (Kirk & Gillon, 2009; Scammacca et al., 2016).

Stanovich (2009) describes the gap in reading ability between proficient and non-proficient readers as the Matthew Effects; and teachers must use instructional methods that can bridge this widening gulf in reading abilities. Research shows that structured literacy and scaffolded reading in context particularly benefit older adolescents with literacy deficits compared with less robust, multilevel reading instruction (Lovett et al., 2000; Collins, et al., 2020). In older students, phonics interventions alone show minimal gains in reading fluency and comprehension (Arnbak & Elbro, 2000), and multiple component interventions are much likely to be effective (Fogarty et al., 2014; Language and Reading Consortium [LARC], 2015). Readers with literacy deficits who are provided instruction in multiple language structures improve word-level and reading comprehension skills over phonetic instruction alone (see Hattie, 2009; LARC, 2015; Worthy et al., 2018). The body of evidence indicates that narrow paths of instruction focusing on one or two components of language do not provide sufficient support to significantly improve reading ability for older adolescent students many grade levels behind their peers (Fletcher et al., 2019; Fogarty et al., 2014).

Helping High School Readers

Reading research has shown that scaffolded reading in context using structured literacy instruction improves student word-level and reading comprehension skills (see Collins, et al.,

2020; Moats, 2020; Tighe & Schatschneider, 2016). Robust reading interventions are necessary to help older readers with significant literacy deficits improve their literacy skills multiple grade levels each school year to close large gaps in reading proficiency. However, there is scant research showing successful reading remediation in older adolescents (Lovett et al., 2021), and there is a strong need to accelerate remediation. While software will never be able to replace the ability of an excellent teacher to help students, we must look for ways to bridge technology with effective curriculum and research-proven instructional techniques to leverage the resources we have for the best benefit of our students.

Educational software and adaptive technology are now commonplace, and students are becoming acclimated to online learning environments. Benefits of computer-based interventions include standardized implementation fidelity, and attendance issues are minimized because students pick up where they left off in prior sessions. Technology allows students to access exactly the content they need when they need it. However, students must be able to read to learn course curriculum. Students in the intervention group used the Readable English online text conversion software to convert Plato Credit Recovery coursework into Readable English text. Would students demonstrably benefit from reading course content and completing assignments in the markup?

Materials and Method

Participants

Participants were students in grades nine through twelve selected from two alternative high schools in the suburban Midwestern United States based on screening results. Participating students (N = 25) included seven males and females each in the intervention group and seven

males and four females in the control group. All students demonstrated significant deficits in reading fluency, rate, accuracy, word reading skills and were all classified as having specific learning disabilities in reading. Students' average GORT-4 Passage Reading Comprehension was 4.2 grades below placement grade, meaning reading coursework would be difficult for them. Beginning of the year assessment mean scores by grade equivalent for both control and treatment groups for measures of Burt Word Reading Test and Gray Oral Reading Tests, Fourth Edition (GORT-4), Oral Reading Fluency, reading rate, reading accuracy, and Passage Reading Comprehension are shown in Table 1. Participants were all native English speakers under age 20.

Table 1

Student Demographics and Means of Pre-Test Reading Skills Age-Based Scores

Factor	Readable English <i>n</i> =14		Control Group <i>n</i> =11	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Age	16.6	1.0	16.4	1.5
GORT4 Reading Rate	12.7	1.8	11.9	2.9
GORT-4 Reading Accuracy	13.4	2.2	13.6	2.7
GORT-4 Reading Fluency	12.8	1.8	12.5	2.8
GORT-4 Reading Comprehension	12.0	2.4	12.3	2.9
Burt Word Reading	11.2	1.4	10.8	1.8

Procedure

Treatment Groups

Ideally, coursework for credit recovery would be built around a culturally sustaining pedagogy that celebrates student diversity. Plato Learning Solutions Credit Recovery Program focuses on the specific core coursework each individual student needs to successfully complete to earn high school credits for graduation. While the program allows students to exempt pretest portions of courses based on the knowledge students bring with them, the curriculum could be

more culturally diverse. For example, reading Shakespeare is not easy, appealing, or relatable for most adolescents, and it requires frontloading a lot of historical and linguistic contexts.

Though explicatory videos, graphics, and other media are used to teach and engage students, the program is very text heavy. Plato has become the de facto education solution for students in alternative school settings in which one teacher is supposed to support instruction for four grade levels and all core courses. Students with reading disabilities in alternative school do not, in fact, have many “alternatives” to text heavy online learning. As a result, students who need the most supports often are warehoused in alternative school until they can drop out.

This study occurred because the new superintendent insisted that at least one alternative school would receive additional support through a reading intervention called Readable English. The standardized test data paint a picture of student success in numbers. More meaningful to the students and teacher, however, are the fact that 13 of the 14 students in the Readable English group passed their end-of-year state tests in December, and the remaining student passed in May compared to the expected pass rate in the control group of only one of 11 students in May.

Students in the control and intervention groups were enrolled in alternative high schools which required online coursework in Plato Courseware as part of credit recovery. Plato Courseware is an online learning program by Edmentum offers curriculum from both core and elective courses for grade levels six to twelve. Courses are self-paced and can be used to earn first-time course credit or to recover credits from failed or incomplete coursework. Plato is widely used in school settings to help students at-risk of failing high school recover credits needed to graduate.

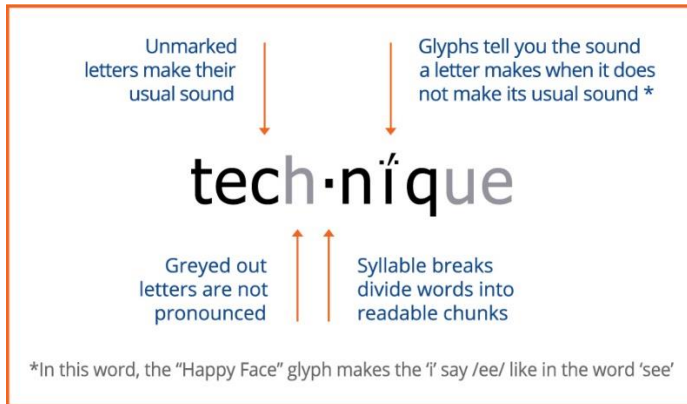
During the 14 weeks of this study, students in the control group completed Plato coursework and received phonics and sight word instructional support as needed to read

coursework text at student request. Students in the treatment group received 47.5 hours of Readable English intervention instruction and were required to use the text conversion program to embed their Plato Coursework and other required reading with the Readable English markup. Intervention instruction was delivered both in-person and via Readable English online interactive lessons and text conversion software. All participants in the treatment group completed Phases 1 and 2 of word-level reading skills and were working in week 2 of Phase 3 writing and comprehension when the study concluded. All students completed pre- and post-tests in measures of Oral Reading Fluency and Passage Reading Comprehension using the GORT-4. Word reading skill was assessed using the Burt Word Reading Tests (2007 revised).

Readable English Reading Intervention

Readable English is a reading intervention that takes a unique approach to improving both word-level reading and reading comprehension skills. The program provides interactive orthography that supports grapho-phonemic access to word recognition by using glyphs over letters to indicate pronunciation without changing the spelling of words (See Figure 1). Phonemic access is further supported by “graying-out” the silent letters of words while visually retaining all letters, thus keeping words recognizable. Because unknown words remain intact, orthographic-semantic analysis allows for direct lexical retrieval of the word. Words are displayed as distinct syllables, aiding in pronunciation, and allowing readers to easily see the morphemes and intuit word meanings.

Figure 1 *Example of Readable English Markup*



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In practice the student is pronouncing the word and either recognizing the words or analyzing the word parts for meaning and use within the context of the sentence. Using this three-part system, the reader can reliably pronounce words while seeking recognition of the written word or analyzing the word parts to ascertain meanings of unknown words. If a word is unknown, the student may infer the meaning of the word from the meanings of known word parts and the word's use within the context of the sentence. This process of accurately reading and recognizing words must occur quickly enough that the meaning of the text can be synthesized in short term memory and attached to schema in working memory. While reading text marked up this way, students are using and strengthening the main structures of language: phonemic, orthographic, semantic, syntactic, morphemic, and pragmatic skills. In later phases of the program, writing and deep reading discussion stretch and strengthen cognitive skills like problem solving, reasoning, inference making, attention, and memory that are requisite skills for good reading comprehension.

These structured literacy skills are embedded within the Readable English intervention. Scripted instruction is explicit and systematic, with focus on recency, relevancy and repetition for skills mastery and automaticity. As students master new words, they can turn off the markup on those words, so that only words they require assistance reading retain the Readable English markup. This interactive orthographic cueing system creates scaffolded reading support that is uniquely individualized for each learner's needs.

During Phase One, students learn standard English phonetic sounds, diphthongs, and digraphs. Once these are mastered, students learn the 21 glyphs and sounds that explicitly teach non-standard sounds of letters in words. Students learn the glyph symbols through a series of 30-second videos that include memorable songs and body movements. The glyphs are situated around the letters they are cueing, thus resembling diacritical marks. Students interact with glyphs through games and online or in-person practice activities to acquire automaticity of usage, and each skill must be mastered before advancing to new skills. Once the 21 glyphs are learned (about six weeks), students or teachers can convert any text at the appropriate instructional level. Students have an immediate path to word recognition through phonics review, decoding, and morphological awareness.

In Phase Two, students practice word attack, spelling, word reading, and reading in context using text in the Readable English markup. Students practice using this three-part scaffold while building reading volume and improving accuracy. Readers also practice using the online text conversion tool to convert text from standard English to text with the Readable English markup. It is the conversion tool that superimposes glyphs to text, facilitating pronunciation of words that do not follow typical spelling conventions; and it also divides words

into syllables and grays out silent letters. Clicking on a word provides the definition and an audio recording of the unknown word. Right clicking on a word turns the markup on or off that word, depending on what the student needs.

Phase Three involves scaffolded writing projects, reading comprehension strategies, and reading grade-level content and curriculum that students convert into Readable English. This phase integrates phonics, phonemic awareness, syllable pattern recognition, morphemic analysis, semantics, pragmatics, inference making, and vocabulary. The goal of the intervention is to strengthen those skills to improve word reading fluency and reading comprehension. In addition to materials embedded in the Readable English program, any digital curriculum may be copied and pasted into the conversion tool and the markup will be applied to the document. Students may practice reading in context using text in the Readable English markup. The flexibility to convert coursework provides the opportunity for individually scaffolded support reading grade level text.

Because Readable English makes all text decodable, students practiced reading using passages they chose individually from NewsELA.com or ReadWorks.org. Student choice greatly enhanced the students' motivation to read, and the teacher did not have to try to find passages that the whole group would like. Students practiced reading silently and with the teacher individually or in a small group. Then students came together daily to share their chosen passages. This highly individualized approach to structured literacy instruction allowed students to tap into their interests and use their background knowledge to learn new skills and content. It was apparent that students had a wealth of vocabulary knowledge learned both from core courses

(e.g., earth science, math, history, etc.) and from individual interests, and when they were allowed to choose their own text vocabulary and background knowledge was an asset.

Design

This quasi-experimental pilot study includes students grouped by convenience rather than by random assignment. Students at one alternative high school who received standard instruction constituted the control group, and the treatment group was composed of students at another alternative high school in the same county who received standard instruction plus reading intervention with Readable English. Data were analyzed using comparisons of means, descriptive statistics, and independent samples t-tests. T-tests indicated no statistically significant differences between the control and intervention groups in participant age, GORT-IV pre-test measures of reading rate, accuracy, fluency, comprehension, or the Burt Word Reading Test. Post hoc power analysis was conducted due to concerns that the analyses may be underpowered and may fail to exclude or may not be robust enough to detect meaningful effects in small sample sizes (Sullivan, et al., 2016). The homogeneity of variance assumption was met, so data were analyzed with independent t-tests rather than Welch's t-tests.

Results

Students in the intervention group experienced substantial gains in reading rate, accuracy, fluency, word reading, and reading comprehension, far outpacing their peers in the control group (see Table 2). Due to the small sample sizes these tests were underpowered, meaning that there is an increased risk of failing to detect significant effects or finding significant effects that may not truly exist. Nevertheless, reading accuracy, fluency, and comprehension results were statistically significant. Reading accuracy and fluency both demonstrated large effect sizes and reading

comprehension had a moderate effect size. Both reading rate and word reading scores were meaningfully improved in the intervention group and showed moderate and large effect sizes, but they were not statistically significant. Students receiving Readable English support more than one grade level in reading comprehension and reading rate, and almost a grade level in word reading, but they grew more than three grade levels in reading accuracy and 2.4 grade levels in reading fluency.

Table 2

Mean Grade Equivalent Changes and Independent Samples T-Test Results of GORT-4 and Burt Word Reading Tests

Measure	Readable English <i>n</i> = 14		Control Group <i>n</i> = 11		Independent T Tests				
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>df</i>	<i>p</i>	<i>d</i>	Observed Power
GORT4 Reading Rate	1.1	1.1	0.7	0.8	1.06	23	.30	.43	.53
GORT-4 Reading Accuracy	3.3	1.7	0.5	1.9	3.92	23	<.001	1.58	.58
GORT-4 Reading Fluency	2.4	1.3	0.7	0.9	3.71	23	<.001	1.50	.50
GORT-4 Reading Comprehension	0.9	1.9	-0.2	1.8	1.49	23	.15	.60	.51
Burt Word Reading	0.8	0.8	0.4	0.9	1.17	23	.25	.44	.50

Note. Cohen's *d* effect sizes are defined as follows: $g \geq 0.2$ small effect, $g \geq 0.6$ medium effect, $g \geq 0.8$ large effect (Cohen, 1992). GORT-4 = Gray Oral Reading Tests, Fourth Edition; Ten months equals one year of grade level growth (1.0).

Discussion

This study sought to determine the effectiveness of the Readable English reading intervention program for older adolescent students with severe reading deficits. Based on reading theory and our prior teaching experience, the program appeared likely to help readers with a wide variety of abilities rapidly be able to accurately read increasingly complex text. This is important because as students age it becomes increasingly difficult to remediate students with large deficits in reading proficiency. Older adolescents not reading on grade level have less accessibility to course curriculum than peers with greater reading proficiency. Decreased learning of core curriculum compounds over time.

Students with severe reading deficits are typically removed from their regular classes to receive reading intervention and help with coursework. Removing students from regular instruction to provide reading remediation leads to missed instruction in core curriculum, missed opportunities to engage in class discussion and group projects, and differentiates students from their peers. As a result, students with significant reading deficits continue to fall further behind their same-age peers academically, experience a real or perceived social stigma, and often develop maladaptive behaviors (National Center for Learning Disabilities, 2017). Reading remediation for high school students is a complex issue requiring a highly effective intervention to significantly improve reading for students reading many years below grade level.

Reading Gains

Study findings show that Readable English reading intervention helped high school students with reading deficits make meaningful and statistically significant gains in reading fluency and comprehension compared to the control group. The participants attended alternative schools and experienced both behavior deficits and reading deficits in both fluency and

comprehension. Prior to intervention, study participants showed word reading skills deficits between 3.6 and 4.6 years below grade level and reading comprehension skills deficits between 4.1 and 4.2 years below grade level. Improving word level reading skills is essential because students must first be able to read the words on the page in order to gain comprehension from text. All study participants benefited from increased reading practice, as shown by growth in measures of word level reading skills. Students who received the Readable English intervention outperformed those who did not.

Keeping in mind that the goal of reading is to get meaning from text, one must ask if Readable English improved the reading comprehension of these adolescent readers. The treatment group's mean passage reading comprehension improved 1.2 grades, which is remarkable considering three months of learning loss sustained by the control group ($M = -0.3$). Prior research indicates that older readers with reading deficits may substantially benefit from explicit, sequential instruction that includes the component elements of structured literacy (Tighe & Schatschneider, 2016), and this study supports those prior findings.

Transfer Effects

An important goal during the study was to enable students to read Plato course curriculum using the Readable English markup so that they could graduate high school. The overarching instructional goal was to improve student reading skills enough to enable students to read age and grade appropriate text in standard English. The scaffolding effect of the markup is akin to learning to ride a bike with training wheels. Once the training wheels come off, one expects there will be a transfer effect such that the rider is able to continue riding the bike, improving with practice. Indefinitely converting text to the Readable English markup would be

as limiting for a reader as indefinitely using training wheels would be for a competitive cyclist. Therefore, an important study question was whether students in the intervention group would experience a transfer effect from reading course materials using the Readable English markup to proficiently reading text in standard English when the markup was removed.

Students received intervention using Readable English markup, but the Burt Word Reading Test and GORT-4 assessments were presented to students in standard English text. Student gains measured by these assessments demonstrated transfer effects and showed significant improvement in word level reading skills. The probable mechanisms for these improvements are explained by Triple Word Form Theory (Coltheart et al., 2001). Orthographic mapping occurs as students read words aloud correctly while seeing the full spelling of the word (Ehri, 2014). Words read correctly multiple times eventually become known, and the need for additional supports decreases (Ehri, 2014). Automaticity of word recognition increases rate and accuracy, helping to build reading fluency (Ehri, 2015). As word reading automaticity increases, incremental cognitive resources are freed for additional syntactic, morphemic, and semantic analyses requisite to building vocabulary (Ehri, 2015). Spending less time trying to read the words on the page means the reader has more short-term memory capacity to consider how words are used in sentences, infer the meanings of unknown words, and synthesize information being read (Berninger et al., 2010). Increasing reading fluency lightens the reader's cognitive load, allowing words read to be synthesized into meaningful chunks of information in working memory.

Assets-Based Approach to Reading

The participants in this study have variety of reading skills deficits that were very responsive to the Readable English intervention. The magnitude of their response to the intervention suggests that these students came with many more skills than they were credited as having, that they wanted to learn, and that they were likely “instructional casualties.” Students who respond well to effective instruction are students who previously have been frustrated by a persistent lack of high-quality reading instruction.

Years of not being successful students takes a nasty toll on the mental health of children and adolescents, and as a result many study participants were not initially receptive to more reading instruction. Students in the Readable English group were much more engaged when offered the opportunity to choose their own reading material from ReadWorks.org or NewsELA.com. An assets-based approach to reading recognizes the many strengths and interests of a student and builds upon them (Ladson-Billings, 2006). Had these same students received instruction in Readable English earlier in their education they would have been able to participate in many more personally relevant reading activities. Instead, they accrued an educational debt that put them at-risk for dropout or expulsion. The district’s goal was for these students to earn enough course credits to graduate from alternative school. That the students in the intervention condition were willing to tackle algebra, earth science, and Shakespeare once they received appropriate scaffolded instruction is a testament to their character and fortitude. It also demonstrates our innate need to be seen as competent by one’s peers.

Implications

The findings from this study indicate that older readers with large reading deficits dramatically increased their reading fluency primarily through word reading accuracy.

Anecdotally, teachers reported that student behaviors improved considerably and appeared to be correlated to improved reading and academic success in the intervention group. Students said they liked the security of knowing they would be able to read any word encountered using the Readable English markup. Many students reported feeling increasingly self-confident as they experienced increased reading and academic success.

Implications of these findings suggest that non-proficient readers may be able to significantly close reading achievement gaps and move into grade level text, thus missing less class time due to pull-out intervention instruction. Resultant increased academic success and less time out of class could decrease maladaptive behaviors for some students. Younger students with below average reading skills and English language learners (L2 learners) might significantly benefit from an unambiguous approach to decoding English. Given the unique scaffolding of the Readable English conversion tool (now available as a Google Chrome extension), all students could become proficient readers and enjoy a high level of competency in the classroom.

Limitations and Future Research

There are several limitations to this study. The small sample size ($N = 25$) caused reduced statistical power that may have limited the significance of statistical comparisons of reading rate and word reading. The ceiling effects of the GORT-4 demonstrated it was not sufficiently sensitive to fully capture changes in measures of reading fluency. Additional, more sensitive comprehension assessments should be used to better reflect comprehension variances.

That students were grouped by convenience, rather than randomly assigned to either the treatment or intervention group means we need to consider potential teacher effects, especially given the small sample size and that there were two different teachers.

Given these considerations the generalizability of these study results to the general population is limited. However, the findings from this pilot study indicate the need for an expanded study, as this intervention uses a unique intervention approach and appears to be effective with older students. Future studies should consider expanding scaffolded e-reader instructional time to provide additional reading practice. Post testing for far effects to determine if lasting change in reading fluency and/or comprehension persists would be important. Increasing intervention time spent in Phase 3 writing and comprehension should further boost reading comprehension, but this must be studied.

A larger sample size across several grade levels with a longer intervention duration would provide increased information on the effectiveness of Readable English for readers of different ages and with varying degrees of reading proficiency. Given the meaningful increases in reading skills of the high school students in this study, it could be valuable to study the efficacy of Readable English with younger students and students of various ages who are learning English.

Conclusions

Student reading fluency and comprehension skills in the Readable English intervention group showed gains large enough to significantly reduce reading deficits for study participants despite the short duration of the trial. These are exciting gains for students with reading disabilities who also have behavior difficulties that landed them in alternative school. Not being

able to read proficiently makes it very difficult to read to learn new content, and not being good at one's job is frustrating. The teacher of the intervention group reported that all her students experienced improved self-confidence and improved work ethic. Remarkably, one student who had regular physical and verbal outbursts before the intervention was transformed into a calmer, happier person once she began being more successful in class. While we could dismiss these as teacher musings, it makes sense that students want to be competent at their job and look like they know what they are doing in front of their peers. Relieving that performance anxiety by introducing an effective intervention tool should provide emotional, as well as academic relief. Readable English appears to be an effective tool to accelerate reading remediation for students with reading disabilities.

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