Adolescents with Limited Reading Proficiency: The Relationship Between Oral Reading Fluency and Reading Comprehension, A Multiple Probe Study of a Word Level Intervention, and Teaching Literacy Skills for Content Learning

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Abstract

Organized as a set of three manuscripts, this research draws attention to the academic learning experiences for adolescents, with particular attention to adolescents with limited reading proficiency, and the use of single case design research as a viable option for discovering solutions to a persisting research-to-practice gap in education. Data analyses included a systematic literature review with findings synthesized into themes using qualitative methods, a multiple probe single case design, a non-parametric statistical analysis, and effect size calculations.

The first article is a systematic literature review on the relationship between oral reading fluency and reading comprehension for adolescent with limited reading proficiency (ALRP) in grades 6-12. The results of 22 studies were synthesized into five themes and results suggest that knowledge of an adolescent's ORF provides helpful information about his or her reading profile, but is not sufficient to evaluate instructional needs nor measure progress. The article concludes with a discussion on the envelopment of ORF within the Simple View of Reading specifically for adolescent readers as well as implications for practitioners, researchers, policymakers, and assessment developers.

The second article presents the findings from a study on the influence of a word level intervention on multiple reading component skills. Six students in two different intervention classes in Virginia participated. The primary analysis was based on a single case design, specifically a multiple probe across participants and settings design. Visual analyses of baseline and intervention phase data indicated a functional relationship between the word level intervention and multiple reading component skills. Statistical analysis (Tau-U) supported this finding with aggregated small effect sizes (0.14 to 0.54) for word identification, accuracy, and automaticity, and one moderate effect size (.70) for prosody. Secondary analysis showed a significant effect for improved strategy knowledge and skill with a 0.90 effect size, but no statistically significant group effects for silent reading fluency and sentence comprehension.

The third manuscript is a broad overview of adolescent literacy instructional recommendations and presents a vision for how all teachers contribute to the development of strategic learners when they support content learning through literacy-rich classroom environments.

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General Audience Abstract

This research draws attention to the academic learning experiences for adolescents, with particular attention to adolescents with limited reading proficiency. The first article examines the relationship between oral reading fluency and reading comprehension for adolescent with limited reading proficiency (ALRP) in grades 6-12. Results suggest that knowledge of an adolescent's oral reading fluency (ORF) provides helpful information but is not sufficient to evaluate instructional needs nor measure progress. Discussion includes where ORF fits within the Simple View of Reading theory specifically for adolescent readers as well as implications for practitioners, researchers, policymakers, and assessment developers. The second article presents findings from a study on the influence of a reading intervention on multiple reading component skills of adolescents with limited reading proficiency. Six students in two different intervention classes in Virginia participated. Visual analyses of individual baseline and intervention phase data indicated a functional relationship between the reading intervention and multiple reading component skills. Additionally, there was a significant group effect for improved strategy knowledge and skill, but no statistically significant group effects for silent reading fluency nor sentence comprehension. Discussion includes limitations and implications for future research, intervention teacher practice and school improvement leaders. The third article gives a broad overview of adolescent literacy instructional recommendations and presents a vision for how all teachers contribute to the development of strategic learners when they support content learning through literacy-rich classroom environments.

Dedications

To my husband Andy – for his patience, support of my aspirations, sense of humor, and parental partnership

To my son Deland – for his genuine interest in my work and his encouragement

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Chapter 1

Introduction

By high school, many adolescents have experienced a compounding lack of literacy practice and success in school. Franzek (2006) suggests, "the most significant point of agreement [in the literature] is the assertion that there is a problem with adolescent reading achievement." Fourteen years later, this statement is still accurate, and the problem is often represented as an *adolescent literacy crisis*. Additionally, 65 percent of fourth and eighth graders continue to experience limitations in their independent reading of grade level text (NAEP, 2019). Specifically, high school readers performed lower in 2015 than their counterparts in 1992, when the National Assessment of Educational Progress (NAEP) reading assessment was first administered. Despite wide-spread agreement among policymakers, educators, and scholars on the need for improved adolescent literacy assessments to influence instruction (Torgesen & Miller, 2009), middle and high schools commonly lack meaningful, diagnostic, and efficient assessment tools and methods to determine readers' needs.

Case in point, for elementary age readers, literature reviews show a correlational relationship between oral reading fluency (ORF) and reading comprehension (RC; Fuchs, Fuchs, Hosp, & Jenkins, 2001; Reschly, Busch, Betts, Deno, & Long, 2009), and other literature reviews suggest the technical adequacy of ORF as a means for predicting RC (Reschly et al., 2009; Wayman, Wallace, Wiley, Tichá, & Espin, 2007). However, longitudinal studies and qualitative investigations of university and adult readers (e.g., Birch & Chase, 2004; Corkett, Parrila, & Hein, 2006; Corkett, Hein, & Parrila, 2008; Fink, 2008; Hoeft et al., 2011) and some quantitative studies with adolescent readers (e.g., Clemens, Simmons, Simmons, Wang, and Kwok, 2017; Gelbar, Bray, Kehle, Madaus, & Makel, 2018; Valencia et al., 2010) show varied influences of ORF on RC, and some readers with dyslexia are able to compensate for weak word level skills to achieve proficient RC. To date, there has not been a published synthesis of related quantitative studies, focusing on adolescents and specifically those with limited reading

proficiency. Some evidence exists that prosody, an underrepresented component of oral reading fluency, and reading comprehension correlate for adolescent readers (Kuhn & Schwanenflugel, 2019; Kuhn, Schwanenflugel, & Meisinger, 2010; Paige, Rasinski, Magpuri-Lavell, & Smith, 2014; Paige, Rasinski, & Magpuri-Lavell, 2012).

While using existing reading assessments and procedures, we know that comprehensive reading interventions aimed at building strategic readers are effective for adolescents (Scammacca, et al., 2016; Slavin et al., 2008; Swanson et al., 2014). In fact, for the last 20 years, since the passage of No Child Left Behind, there has been increasing pressure for schools and teachers to select evidence-based practices (EBP), those supported by extensive, high-quality evidence demonstrated through systematic research, and that align with their student needs. The Institute for Education Sciences was established by the federal government so that a researcher or research team could design an intervention, eventually evaluate its effectiveness through a randomized control trial, and show evidence it can work.

Subsequently, the EBP is reviewed by the What Works Clearinghouse and added to this and other approved lists. School districts are highly encouraged, or required in many cases, to select practices from approved lists and implement them with fidelity (the degree to which key components of an intervention are delivered as planned by developers across time; Proctor et al., 2011). However, there are elements in this equation that have not been thoroughly explored yet: 1) Adaptations when teaching an EBP are inevitable, unavoidable, and sometimes desirable (Leko, 2015; Leko, Roberts, & Pek, 2015); 2) We have a continued achievement gap despite thousands of research dollars, 3) There is a persisting research-to-practice gap (Bryk, Gomez, Grunoz, & LeMahieu, 2015; Dolle, Gomez, Russell, & Bryk, 2013), and 4) Each EBP has not been evaluated for effectiveness under in all possible settings and for all types of learners. Corroborating these points, Cook & Cook (2011) explain that we need to gather evidence regarding "where and under what conditions a practice works, with whom the practice works, how a practice can be adapted and maintained successfully, and how practitioners feel about a practice" (p. 1).

Empirical evidence for many literacy practices relies on an interpretation of averages, and it is up to practitioners to fit their use within their context and for their unique students (Leko, 2015; Leko, Roberts, & Pek, 2015). Additionally, evidence from group experimental design shows that reading interventions change the average growth of *groups* of participating students, yet the effectiveness of reading interventions on multiple reading component skills for *each* participant can be explored further. We need to understand how evidence-based reading interventions taught by teachers affect individual readers, meaning which skills in their reader profile change as they are learning and after they have learned a reading strategy. One promising methodology for this purpose is single case design. In the past, single case design research has been used to influence intervention design, establish proof of concept, and prepare the conditions for a more rigorous evaluation of effectiveness. Further, single case design has been used frequently to analyze the influence of interventions on behaviors expected to show immediate effect during intervention. Based on recent applications of rigorous, experimental single case design with reading interventions, there is some evidence that illustrates its potential to measure reading skill growth with delayed latency effects during intervention (Regan, Berkeley, Hughes, & Kirby, 2014; Solis, et al., 2018).

To address these gaps in literature, the studies presented here incorporate a complete construct of oral reading fluency among other reading component skill assessments to view growth in adolescent reader profiles in a comprehensive way after and while learning an evidence-based reading intervention. These studies show promise for researchers to better understand for whom a word-level intervention works, when growth begins for specific skills, and under what conditions.

Research Questions

This research draws attention to the academic learning experiences for adolescents with particular attention to adolescents with limited reading proficiency (ALRP), the influence of theoretical reading frameworks on student outcome measures used in research and in teacher practice, and single case design research as a viable option for discovering solutions to a

persisting research-to-practice gap in education. The following five research questions guided this inquiry.

1. To what extent does oral reading fluency serve as a predictor of comprehension for adolescents with limited reading proficiency?
2. To what extent is it appropriate to rely on oral reading fluency scores to determine adolescent readers' needs and their comprehension abilities?
3. Do the word level skills (i.e., word identification, oral reading accuracy, rate, and prosody) of adolescent readers with limited reading proficiency improve when they are taught the Bridging Strategy intervention?
4. Which factors (i.e., strategy use, silent reading fluency, or sentence comprehension) improve for adolescent readers with limited reading proficiency after learning the Bridging Strategy intervention?
5. What teaching behaviors make discipline-specific reading tasks, mastery of concepts and vocabulary, and the volume of content accessible to all learners?

The first and second questions addressed specific gaps in knowledge in the field related to the construct of oral reading fluency. The overall aim of this literature review was to clarify the relationship between ORF and RC for ALRP. In an attempt to align theory and assessment of reading fluency, Kuhn et al. (2010) conclude that current implementation of fluency instruction and assessment in many schools and classrooms is built upon an incomplete conceptualization of the fluency construct. One potential reason is likely the efficiency and objectivity of measuring oral reading accuracy and rate and due to federal policies and accountability pressures prompting frequent assessment of fluency to identify students with specific learning disabilities (Deeney, 2010). Nonetheless, there is a tendency for what we test to become what we teach, and what we emphasize to become what appears to matter most; however, unintentional these actions may be. Adolescent literacy researchers and practitioners in middle and high schools need accurate means for determining adolescents' reading needs, measuring their progress, designing instruction, and selecting specific interventions.

The third question guided the design and implementation of a multiple probe single case analysis with the goal of informing researchers and practitioners about which aspects or the collective whole of a word-level intervention cause change for individuals who tend to be so variable in their profile as to violate assumptions of averages. In addition to visual analysis, an additional factor for magnitude, the Tau-U effect size, was calculated to increase respectability of findings in comparison with the results of research using other designs (Shadish, 2014).

The fourth question focused on a secondary analysis to determine differences between pre- and post-test scores on measures of strategy-use, silent reading fluency, and sentence comprehension. For this analysis, I used the Wilcoxon signed-ranked test, which is the non-parametric alternative test to the pair-samples t-test for related observations (Wilcoxon, 1945). This test is the most appropriate test for the given data and assumptions made about the population in that it does not make any assumptions about normality given that the analyses is conducted on ranked scores (Moore & McCabe, 2005). Additionally, effect sizes were calculated to allow for comparisons across multiple reading component skills assessed in this study.

Finally, the fifth question focused on academic literacy related to disciplinary-specific texts and adolescent learners; thus, the following literacy components were elaborated on: 1) reading, 2) writing, 3) vocabulary, and 4) speaking and listening. Each section of this chapter began with planning considerations to identify the best teaching strategies for content learning.

Significance of the Work

The school improvement climate today requires schools to select and implement practices backed by research explicitly studied for groups of students in settings similar to the school demographics. While simultaneously, there is a call for research to better understand under what conditions and for whom evidence-based practices work (Bryk, et al., 2015; Dolle, et al., 2013). Among key recent findings, the science of learning indicates that opportunities for growth and change persist across the development continuum; variability among individuals is the norm; and each individual's development is non-linear due to neural plasticity and brain malleability in response to learning tasks and the environment (Cantor, Osher, Berg, Steyer, & Rose, 2019).

Thus, educators need research findings and syntheses explicating the core components of EBP to allow for responsible and responsive adaptations based on individual and contextual factors (Leko, 2015).

Specific to adolescent literacy, some readers reach adolescence with gaps in several areas (i.e., phonics, decoding, vocabulary, fluency, and comprehension) and have profiles of mixed strengths and weaknesses in different reading component skills (Brasseur-Hock et al., 2011; Dennis, 2012; Hock et al., 2009). Across studies, most adolescents with below-average reading comprehension scores had below-average reading component scores with individual differences in reading skills (e.g., ORF, decoding, vocabulary) likely leading to their lack of proficiency with reading comprehension (i.e., Brasseur-Hock et al., 2011; Cirino et al., 2013; Clemens, Simmons, Simmons, Wang, & Kwok, 2017; Cutting, Materek, Cole, Levine, & Mahone, 2009; Dennis, 2012; Tilstra, McMaster, Van den Broek, Kendeou, & Rapp, 2009). Brasseur-Hock et al. (2011) include a profile for readers who are low across all reading skill components when compared to normative scores for readers of all skill levels, finding adolescents with (a) significant skill weaknesses, (b) global skill weaknesses, (c) dysfluent readers, (d) knowledge weaknesses, and (e) reading strategy weaknesses.

To respond to the needs of ALRP, there is a need to examine how reading theories influence research design for intervention development, measurements of their effectiveness, and examinations of relationships among reading variables. The Simple View of Reading (SVR) is reputable for explaining conceptually the components of reading, and "…hundreds of studies have used this model [the SVR] to guide their investigation and/or interpret their results" (p. 317, Catts, 2018). Researchers have expressed concern that the SVR needs to be enhanced and have proposed their reiterations (e.g., Carver, 1993; Deshler & Hock, 2007; Francis et al., 2018; Snow, 2018). Carver (1993) added rate to the model and extended the model to college readers. Deshler and Hock (2007) suggest the need for an executive functioning component to create a bridge between word recognition and linguistic comprehension. Francis, Kulesz, and Benoit (2018) developed a reading model founded in the SVR, the Complete View of Reading (CVRi),

to show that readers develop differently and approach the reading task differently, showing a differential influence of text features on their fluency and reflecting heterogeneity at the person and passage level. Snow (2018) asserted that the outcome variable for the SVR (i.e., reading comprehension) is difficult to measure and would add "indicators of skill in the three domains identified by LaRusseo et al. (2016) as predictors of comprehension: academic language, perspective taking, and argumentation" (p. 315) as well as indicators of the reader's skills to employ different reading strategies per varied discipline-specific texts.

The studies presented here employ integrated reading theories. Even when the focus of adolescent reading theory and related intervention practices have developmental components by necessity, such as in the case of instruction for ALRP, researchers still need their theoretical lens to relate to the characteristics of adolescents, text and literacy demands, and typical instructional approaches to reading in middle and high school. Strategy instruction respects variability and fills in the gaps between former reading habits, prior knowledge, and the current text demands. Nurturing growth of effective reading habits for ALRP includes re-igniting growth and guiding generalization of newly mastered skills with disciplinary coursework.

Education is growth (Dewey, 2007), thus if growth in academic literacy has not been occurring for many adolescents, then the purpose of education is not being achieved. By this practical reasoning, the real *adolescent literacy crisis* is not within the individual, but their exclusion from ongoing academic literacy development (e.g., it's not them, it's us). To overcome this challenge, the educational field needs to shift from an emphasis on research, design, and implementation of evidence-based practices to a focus on gathering practice-based evidence with effective teaching strategies within varied school contexts and cultures.

Organization of the Dissertation

This dissertation follows a manuscript format, rather than the traditional dissertation chapter format. Specifically, each chapter is a separate manuscript; thus, some redundancy is inevitable (e.g., the framed literature review for the manuscript in Chapter Three shares

information presented in the systematic literature review manuscript in Chapter Two). Each chapter is summarized below.

Chapter Two, titled "A Review of Oral Reading Fluency and Reading Comprehension for Adolescents with Limited Reading Proficiency," is a systematic literature review on the relationship between oral reading fluency (ORF) and reading comprehension (RC) for adolescent with limited reading proficiency (ALRP) in grades 6-12. The results of 22 studies were synthesized into five themes: (a) ORF adds variance to the Simple View of Reading model for ALRP; (b) ALRP have distinct reader profiles; (c) ORF is comprised of more than automaticity; (d) the role of fluency varies; and (e) ORF has tenuous predictive value as commonly defined and assessed. Results suggest that knowledge of an adolescent's ORF provides helpful information about his or her reading profile, but is not sufficient to evaluate instructional needs nor measure progress. The article concludes with a discussion on the envelopment of ORF within the Simple View of Reading specifically for adolescent readers as well as implications for practitioners, researchers, policymakers, and assessment developers.

Chapter Three, titled "A Multiple Probe Study of a Word Level Intervention for Adolescents with Limited Reading Proficiency," is a single case design study that examined the differential influence of a word level intervention on multiple reading component skills of adolescents with limited reading proficiency. Six students in two different intervention classes in Virginia participated. Construct validity of ORF was upheld by including measurements of accuracy, rate, and prosody. In addition, word identification, silent reading fluency, sentence comprehension, and strategy-use was evaluated to gain a comprehensive view of each reader's profile. The primary analysis was based on a single case design, specifically a multiple probe across participants and settings design. Visual analyses of baseline and intervention phase data indicated a functional relationship between the word level intervention and multiple reading component skills. Statistical analysis (Tau-U) supported this finding with aggregated small effect sizes (0.14 to 0.54) for word identification, accuracy, and automaticity, and one moderate effect size (.70) for prosody. Secondary analyses, using a non-parametric test for differences, showed a

significant effect for improved strategy knowledge and skill with a 0.90 effect size, but no statistically significant effects for silent reading fluency nor sentence comprehension. Results include a summative evaluation of procedural and treatment fidelity and inter-observer agreement statistics. Discussion includes connections to reading theory, limitations and implications for future research, intervention teacher practice, and school improvement leaders.

Chapter Four, titled "Teaching Secondary Students Literacy Skills for Content Learning," is a practitioner piece published as a chapter in a book titled *Classrooms: Academic content and behavior strategy instruction for students with and without disabilities* and edited by J. Bakken. Developing literacy in many content areas requires adolescents to be cognizant of the varying skills required by each discipline. Specific teaching behaviors support secondary students' ability to tackle discipline-specific reading and writing tasks, master concepts and vocabulary, and communicate their understanding. The purpose of this chapter is to provide teachers with a summary of specific instructional strategies, using a planning process, so that students become strategic learners and achieve proficiency with advanced, disciplinary literacy. This chapter includes a description of each strategy and recommendations for its use, practical examples, and specific teacher resources for further professional learning.

In conclusion, by adolescence, students' literacy profiles are increasingly complex, thus obliging researchers, school leaders, and teachers to focus their energy on approaches unique to learning in middle and high school. Adolescents with limited reading proficiency will benefit when researchers and practitioners measure skill growth in meaningful ways linked to outcome goals at the secondary level. How is the persisting achievement gap connected to efforts at closing the research-to-practice gap? Adolescent literacy will improve when researchers and school professionals work in genuine partnership to discover how evidence-based practices are implemented with fidelity, adapted in culturally responsive ways, and anchored by systemic and sustained support for professional learning.

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Chapter 2

A Review of Oral Reading Fluency and Reading Comprehension for Adolescents with Limited Reading Proficiency

The passage of No Child Left Behind (NCLB) in 2001 and the subsequent, ongoing emphasis on student performance on standardized tests have had positive and negative consequences for adolescents with disabilities and those at-risk for school failure. Additionally, wide-spread literacy improvement in middle and high schools are not yet realized from this legislation (Niebling & Lovell, 2015). According to the Nation's Report Card (2019), reading achievement for adolescents continues to stagnate. Specifically, high school readers performed lower in 2015 than their counterparts in 1992, when the National Assessment of Educational Progress (NAEP) reading assessment was first administered, and not significantly different from peers in 2013. Efforts to overcome this challenge may have prompted potentially unsuitable use of reading assessment methods for adolescents. In particular, researchers and practitioners may employ varied conceptualizations of oral reading fluency (Kuhn, Schwanenflugel, & Meisinger, 2010). This literature review explores the extent to which oral reading fluency (ORF) serves as a predictor of reading comprehension (RC) for adolescent with limited reading proficiency (ALRP) and the extent to which it is appropriate to rely on ORF scores to determine adolescent readers' needs and their comprehension abilities.

During the last two decades, researchers have increased their efforts related to adolescent literacy by designing and examining the effectiveness of interventions (e.g., Slavin, Cheung, Groff, & Lake, 2008) and by examining relationships across reading component skills (e.g., Brasseur-Hock, Hock, Kieffer, Biancarosa, & Deshler, 2011; Cutting, Materek, Cole, Levine, & Mahone, 2009; Dennis, 2012) in order to influence schools' approaches to meeting adolescent literacy needs (e.g., use of screening and progress monitoring tools). In part, adolescent literacy improvement efforts are influenced by the National Reading Panel's (NRP) recommendations (2000) that reading instruction include phonemic awareness, phonics (decoding), comprehension,

fluency, and vocabulary. Another influence is the development and implementation of response to intervention (RTI) frameworks (also known as a multi-tiered system of supports or MTSS) to address student progress and achievement concerns. This multi-tiered system uses a data-driven decision-making process to intervene at varied levels of intensity when students are not making adequate progress in core curricula (Batsche et al., 2005). Due to RTI's initial use as a process for identifying students with learning disabilities (Bradley, Danielson, & Doolittle 2007), most early adopters of this framework were primarily experienced at the elementary level. Subsequently, middle and high school-wide frameworks for addressing reading difficulties must be handled differently than methods used to remedy reading difficulties discovered in the primary grades or methods used to teach typically developing readers (Biancarosa & Snow, 2006; Ehren, Lenz, & Deshler, 2004; Johnson, Smith, & Harris, 2009). If administrators in middle and high schools attempt to apply similar decision rules as those used in elementary schools, such as inadvertently privileging ORF performance to determine reading needs and progress, they may draw incorrect conclusions resulting in erroneous placement decisions for adolescent readers (Samuels, 2007).

Despite wide-spread agreement among policymakers, educators, and scholars on the need for improved adolescent literacy assessments to influence instruction (Torgesen & Miller, 2009), middle and high schools commonly lack meaningful, diagnostic, and efficient assessment tools and methods to determine readers' needs. Additionally, there are fewer specialized literacy professionals (i.e., reading specialists or literacy coaches knowledgeable in the selecting, administering, and interpreting reading assessments) in secondary schools (Bean et al., 2015). As a result, adolescents with dysfluent aloud reading occasionally may be misjudged about their true abilities, wrongly called *nonreaders*, discrediting their existing skills and strengths (Dweck, 2006; Spencer, Logel, & Davies, 2016). In many cases, their life and school experiences make them capable of using context clues, taking advantage of structures to aid their comprehension, such as graphic organizers, text headings, and pre-taught vocabulary, and employing reading strategies. Simultaneously, these same adolescents are overlooked when they need help, for these

students' listening comprehension, common sense, and vocabulary knowledge may be average or above average, hiding their weak reading fluency. Whether an adolescent's difficulty with reading is outwardly apparent or not, it is imperative for educators to determine his or her literacy needs in order to support their current and future reading success.

Oral Reading Fluency and Adolescent Readers

Reading fluency contributes to adolescent reading proficiency (National Reading Panel, 2000; Brasseur-Hock et al., 2011). In research and practice, oral reading fluency is commonly defined and measured as words read correctly per minute, thereby assessing accuracy and rate concurrently and excluding the role of expression. In the past two decades, oral reading fluency has gone from an unacknowledged component of reading to overemphasized as rate of reading (Kuhn & Schwanenflugel, 2019). Internationally, researchers explore the role of ORF within models of reading and its use as a progress monitoring tool and to identify students with learning disabilities, accentuating differences in the orthographic complexity of varied languages and the importance of ORF to developing reading proficiency (e.g., Abadzi, 2011; Padeliadu & Antoniou, 2014). For instance, Høien-Tengesdal & Høien (2012) determined reading fluently (i.e., accurately and quickly) and comprehending (i.e., gaining meaning from text) combine to represent a reader's reading ability as an outcome variable, rather than ORF functioning as a general reading skill to predict RC.

In reviews on the use of curriculum-based measures for reading (CBM-R, a measure of oral reading accuracy and rate intended to represent grade level curricular expectations) for elementary through middle grade readers, CBM-R correlates with RC and is an efficient method for progress monitoring and screening (Fuchs, Fuchs, Hosp, & Jenkins, 2001; Reschly, Busch, Betts, Deno, & Long, 2009; Wayman, Wallace, Wiley, Tichá, & Espin, 2007). Following this line of research, supportive product development (i.e., AIMSweb), and associated recommended practices, school administrators administer CBM-R three times per year, and teachers emphasize growth in reading accuracy and rate; thus, in effect, ORF becomes a proxy for reading proficiency and predicted performance on reading high-states state accountability tests (Baker et

al., 2008; Shinn, 1998; Shinn, Shinn, Hamilton, & Clarke, 2002). Established ORF expectations for typically developing readers extend from kindergarten through eighth grade (Hasbrouck & Tindall, 2017). For fluent reading, the number of words read correctly per minute initially increases per grade level; however, beginning at the 6th grade level, the number of words read correctly per minute stays the same even as the grade levels increase. Thus, the natural deceleration of rate (i.e., reading speed) as any reader develops could lead to its less accurate use for screening and progress monitoring for adolescents with limited reading proficiency.

Although acknowledging that any label representing a group will be imperfect and hold unintended connotations, in this review, the phrase *adolescents with limited reading proficiency* (ALRP) refers to students in middle and high school whose comprehension of grade level text is insufficient. Typical early readers progress through a hierarchy of component skill development (Ehri, 2005), whereas struggling readers may reach adolescence with gaps in several literacy areas (i.e., phonics, decoding, vocabulary, fluency, and comprehension) and have profiles of mixed strengths and weaknesses in different reading skill components (e.g., Brasseur-Hock et al., 2011; Hock et al., 2009). Reading fluency is the execution of multiple cognitive and language processes (Berninger, Abbott, Billingsley, Nagy, 2001); therefore, reading skills cannot be easily taught in isolation nor in a sequence, particularly for ALRP.

Furthermore, for all adolescent readers, basic literacy skills do not intuitively develop into advanced literacy skills; therefore, teachers will need to support reader development of these skills by teaching students the unique literacy strategies for their discipline (International Reading Association, 2012; Shanahan & Shanahan, 2008). Nevertheless, in middle and high school, some students continue to need basic literacy skill instruction (Faggella-Luby, Graner, Deshler, & Drew, 2012). As middle and high school reading demands include literary analysis and varied types of text (e.g., expository, persuasive), the relationship between ORF and RC may have limited applicability (Paris, Carpenter, Paris, & Hamilton, 2005). For complex texts, higher-order thinking processes may actually require slower reading. Likewise, middle and high school reading tasks are typically completed with silent reading for which performance is not found to

correlate with oral reading (Hale et al., 2007; Dickens & Meisinger 2016). Thus, measures of reading proficiency and progress need to be representative of the outcome skills required in the upper grades and post-secondary settings.

Purpose of the Review and Research Questions

The overall aim of this review was to clarify the relationship between ORF and RC for ALRP. In an attempt to align theory and assessment of reading fluency, Kuhn et al. (2010) conclude that current implementation of fluency instruction and assessment in many schools and classrooms is built upon an incomplete conceptualization of the fluency construct. One potential reason is likely the efficiency and objectivity of measuring oral reading accuracy and rate and due to federal policies and accountability pressures prompting frequent assessment of fluency to identify students with specific learning disabilities (Deeney, 2010). Nonetheless, there is a tendency for what we test to become what we teach, and what we emphasize to become what appears to matter most; however, unintentional these actions may be. Adolescent literacy researchers and practitioners in middle and high schools need accurate means for determining adolescents' reading needs, measuring their progress, designing instruction, and selecting specific interventions.

Literature reviews on ORF for elementary age readers (Fuchs et al., 2001; Reschly et al., 2009) and its technical adequacy (Reschly et al., 2009; Wayman et al., 2007) show a correlational relationship with RC. Longitudinal studies and qualitative investigations of university and adult readers (e.g., Birch & Chase, 2004; Corkett, Parrila, & Hein, 2006; Corkett, Hein, & Parrila, 2008; Fink, 2008; Hoeft et al., 2011) and some quantitative studies with adolescent readers (e.g., Clemens, Simmons, Simmons, Wang, and Kwok, 2017; Gelbar, Bray, Kehle, Madaus, & Makel, 2018; Valencia et al., 2010) show varied influences of ORF on RC, and some readers with dyslexia are able to compensate for weak word level skills to achieve proficient RC. However, there has not been a synthesis of related quantitative studies, focusing on adolescents and specifically those with limited reading proficiency. Thus, the results of this review provide a reflection for the field on how researchers have chosen to define and measure

ORF in recent years and how their results connect to reading theory and potentially practices in schools. Additionally, the results of this review serve as a comparison to reviews on the role of ORF for elementary age readers. To address these gaps in knowledge, two research questions guided this review: To what extent does oral reading fluency serve as a predictor of comprehension for adolescents with limited reading proficiency? To what extent is it appropriate to rely on oral reading fluency scores to determine adolescent readers' needs and their comprehension abilities?

Method

Literature Search and Selection

I based this review on the conceptual framework for systematic reviews of research established by Hallinger (2014). His framework prompts the use of the following guiding questions to support interconnectedness among the procedures for literature search, selection, and analysis.

1. What are the central topics of interest, guiding questions, and goals?
2. What conceptual perspective guides the review's selection, evaluation, and interpretation of the studies?
3. What are the sources and types of data employed for the review?
4. How are data evaluated, analyzed, and synthesized in the review?
5. What are the major results, limitations, and implications of the review?

First, in order to discover trends and patterns across studies, I restricted the search to studies using quantitative methods with samples sizes of 30 or greater. Although important, case studies, single case design studies, and research results with potentially low statistical power were excluded due to the focus on relationships between the predictor variable (ORF) and outcome variable (RC) using statistical approaches that require larger sample sizes in order to show social validity (i.e., generalizability of findings; Lenth, 2001). To identify relevant literature, I used the search engines, Education Research Complete and ERIC Digest with no date range, including the search terms *fluen** or *reading rate*, *adol** or *grade 6 or grade 7 or grade 8*

or grade 9 or grade 10 or grade 11 or grade 12 or *ages 11-17* or *high school* or *middle school*, *struggling readers* or *at risk readers* or *learning disab**, and *comprehen** or *prosod** or *assess**, generating 174 peer-reviewed articles after duplicates were removed, as of May 8, 2019. This initial search yielded eleven studies that met the inclusion criteria. To increase comprehensiveness, I searched the reference lists of these initial articles and all subsequently identified articles for additional studies (i.e., ancestral search strategy). Additionally, I examined the reference lists of several meta-analyses, literature reviews, and reports on the broad topic of adolescent literacy (e.g. Kamil et al., 2008; Slavin, Cheung, Groff, & Lake 2008) and a theoretical paper on ORF (Fuchs et al., 2001), yet I did not find any studies that were not already identified through other means. Next, I individually searched journals, in which two or more selected studies were found (i.e., *Journal of Literacy Research, Learning & Individual Differences, Reading and Writing,* and *Scientific Studies of Reading*) by using the search engine on each journal's website. As a final search procedure, I emailed the first author of included studies to inquire about potentially missing studies in my review. Table 1 provides the number of studies yielded by search strategy.

Table 1.

Search strategy and yield

Search strategy	**Articles Yield**
Electronic search	11
Ancestral search	8
Individual Journal Searches	2
Professional contacts	1
Total	22

*After applying inclusion and exclusion criteria

Throughout implementation of the search procedure described thus far, I examined the title and abstract of each article using the criteria outlined in Table 2. In some cases, further inspection of an article was needed to determine with certainty whether a study would be included. Basic, initial selection criteria included empirical studies of study subjects in grades 6-

12 and assessed reading skills in English in the United States. Another criterion for inclusion were that students needed to be assessed on multiple reading component skills. Furthermore, although research literature includes fluency as connected to many reading skills (e.g., word recognition, vocabulary), selected studies must have included a standardized RC measure, and in the present review, only the relationship between ORF and RC was examined. Studies included subjects who were not proficient on RC assessments and may have identified disabilities. Studies were excluded if all subjects were identified as proficient readers. Additionally, studies were excluded if they focused on underlying factors to fluency only and *not* how it relates to RC or focused on a fluency intervention. This review also excluded studies using only high-stakes state accountability tests in reading as the outcome variable because their result represents more than reading comprehension skill, such as knowledge of elements of literature, test-taking anxiety, stamina and motivation due to the length of the test and volume of similar tests. Furthermore, this review was not intended to synthesize studies aimed to determine the technical adequacy of reading curriculum-based measure (CBM-R); thus, if studies focused only on correlating CBM to general reading outcome measures or state reading accountability tests, then they were not included. The combined search methods resulted in 22 empirical studies (e.g., hierarchal multiple regression analysis, latent class analysis, multivariate analysis of variance, and structural equation modeling) conducted in the U.S. between 2006-2019. There were no studies meeting the selection criteria published prior to 2006.

Table 2

Selection Criteria

Inclusion Criteria	**Exclusion Criteria**
Uses quantitative methods with samples size of 30 or greater	Uses qualitative methods or has sample size less than 30
Subjects in 6th to 12th grade	Only subjects in 5th grade or younger

Assessed reading skills in English in the United States	Assessed reading skills in other languages in other countries outside the U.S.
Subjects assessed on multiple reading component skills, including ORF	Focused on measuring intervention effectiveness or technical adequacy of ORF
Standardized reading comprehension measure as the outcome variable	ORF or state reading accountability assessment as the only outcome variable
Some subjects were identified as struggling readers and may have learning or reading disabilities	Focused only on subjects who were identified as proficient readers
Total Yield: 22 studies in the US between 2006-2018	

Analysis of Study Components

Once relevant studies were ready for review, I considered how data would be evaluated, analyzed, and synthesized. Given the varied statistical methods employed in the studies, meta-analysis was not a viable option; therefore, I used analysis and summary charts to capture key components of each study for thematic synthesis. First, I summarized each study that met the criteria for inclusion in a chart outlining research purposes/questions, theoretical framework, definition of ORF, and method. I used a second chart to record claims and warrants of each study to avoid a situation that Hallinger (2014) cautions against—taking data out of context. This enabled a check to ensure that data were summarized and analyzed in ways that were congruent with the stated claims in each article. The final chart can be found in the Appendix (available online), identifying the study platform, methods, and results of each study, a condensed and refined version of the previous two working charts. Lastly, to clarify the overall claim of this systematic review and evaluate the quality and limitations of existing evidence found in the studies, an analytic process including note-taking, free writing, concept mapping, and coding were used to generate several themes (Machi & McEvoy, 2012).

As data analysis for a systematic review is largely inductive, I used an analytic procedure with several recursive steps to ensure consistent analysis (Glaser & Strauss, 1967; Miles & Huberman, 1994; Petticrew & Roberts, 2008). Results of each study were paraphrased to depict a code. A code is a phrase or series of words that represents the explicit and implicit meaning of the results. An example code from Brasseur-Hock et al. (2011), garnered from the results section of their article, was *adolescents with below-average comprehension were divided into five distinct skill profiles, indicating substantial heterogeneity in reading component skills.* Occasionally, some results contained more than one code. Next, codes were compared, and similar codes were clustered into categories. A category captures the meaning of a group of codes at an abstract level, and in the case of this systematic review, categories became themes that unite the results of reviewed studies. For example, when the example code from Brasseur-Hock et al. was corroborated with codes from seven other studies (Cirino et al., 2013; Clemens et al., 2017; Cutting et al., 2009; Dennis, 2012; Lesaux & Kieffer, 2010; Tilstra, McMaster, Van den Broek, Kendeou, & Rapp, 2009), the outcome was the category or theme *adolescents with limited reading proficiency have distinct reader profiles*. To check the quality of each theme, they were assessed for internal homogeneity and external heterogeneity. Internal homogeneity means the codes in a given theme are related with one another; external heterogeneity means themes are unique in their meaning in comparison with other themes. Finally, the results across all included studies were synthesized in the discussion.

Results

In this synthesis, I address the ways in which ORF may be deemed appropriate as a predictor of RC as well as indicate the extent of the relationship between ORF and RC for ALRP. Reviewed studies included ALRP, sometimes within samples of proficient readers. Across the studies, definitions for ALRP (typically termed struggling readers) were characterized as students a) scoring lower than the 40th percentile on at least one standardized measure of reading comprehension, b) scoring within one half of one standard error of measurement surrounding the cut point for pass-fail on the state reading test, c) with a diagnosed disability

related to reading, or d) enrolled in a reading remediation class. In this section, I first provide an overview of how researchers for the included studies chose to define and measure ORF and RC in order to understand assumptions used and to critically appraise each study's results. Next, five key themes are addressed: (a) ORF adds variance to the Simple View of Reading model for ALRP; (b) ALRP have distinct reader profiles; (c) ORF is comprised of more than automaticity; (d) the role of fluency varies; and (e) ORF has tenuous predictive value.

Overview of Studies

Defining and measuring fluency and comprehension. The two key variables of focus in this review are ORF as a predictor and RC as an outcome. The Appendix available online specifies how each of these author(s) defined and assessed ORF and RC. More deliberately, having an awareness of any alignment issues across definitions and measurement of ORF as well as how researchers analyzed their results was important to exploring the extent of its influence as a *predictor* of RC.

Oral reading fluency. Fluency, whether oral or silent, is a complicated process due to the simultaneous execution of rate, accuracy, and prosody (Hasbrouck & Glaser, 2012; Kuhn et al., 2010). For studies providing an explicit definition of ORF, the assessment(s) used in the study were compared with the definition. Four studies did not provide a fluency definition (i.e., Brasseur-Hock et al., 2011; Cirino et al., 2013; Hock et al., 2009; and Talor, Barth, Fletcher, Francis, & Vaughn, 2014); thus, their definition of ORF was inferred based on the assessments selected in the given study. Given that all definitions involved rate, the areas for debate are whether accuracy and prosody are required features of fluent oral reading.

Oral reading fluency as rate alone. Six of the 22 studies defined ORF as reading rate (Adlof, Catts, & Little, 2006; Cirino et al., 2013; Clemens et al., 2017; Cutting & Scarborough, 2006; Cutting et al., 2009; and Dennis 2012). The Gray Oral Reading Test (GORT) rate subtest was the most frequently used measure of rate in connected text. The Test of Word Reading Efficiency (TOWRE) Sight Word Efficiency and Phonemic Decoding Efficiency subtests were often selected to measure rate of isolated word reading. Less commonly used were the Texas

Middle School Fluency Assessment (Passage Fluency and Word Lists) and the Passage Reading Fluency Probe from the easyCBM. To note, Clemens et al. (2017) and Cutting et al. (2009) defined ORF as word reading speed, but measured both rate and accuracy.

Oral reading fluency as accuracy and rate. Twelve of the 22 studies considered ORF to be the number of words read correctly per minute, often referred to as automaticity (WCPM; Brasseur-Hock et al., 2011; Clemens et al., 2019; Denton et al., 2011; Eason, Sabatini, Goldberg, Bruce, & Cutting, 2013; Gelbar et al., 2018; Hock et al., 2009; Kershaw & Schatschneider, 2012; Lesaux & Kieffer, 2010; Ritchey, Silverman, Schatschneider, & Speece, 2015; Savage, 2006; Tighe & Schatschneider, 2014; and Tolar, Barth, Fletcher, Francis, & Vaughn, 2014). Almost all of these studies included more than one standardized measure to assess ORF with passage word reading and also sometimes included measures of isolated word reading. For passage word reading, the GORT Fluency Index (Brasseur-Hock et al., 2011; Cutting et al., 2009; Eason et al., 2013; Hock et al., 2009; and Paige, Rasinski, Magpuri-Lavell, & Smith, 2014) and various types of Curriculum-Based Measurements (CBM; Clemens et al., 2017; Clemens et al., 2019; Denton et al., 2011; Gelbar et al., 2018; Kershaw & Schatschneider, 2012; Lesaux & Kieffer, 2010; Ritchey et al., 2015; Tighe & Schatschneider, 2014; Tilstra et al., 2009; and Tolar et al., 2014) were used. The GORT Fluency Index is the combined scores of the rate and accuracy subtests. Some studies used CBM with selected passages from varied sources, such as narrative and expository textbook passages, released passages from state standardized reading assessments, and Jamestown Timed Reading passages. For isolated word reading, the TOWRE to measure word recognition automaticity was most often selected (Adlof et al., 2006; Brasseur-Hock et al., 2011; Cirino et al., 2013; Clemens et al. 2019; Cutting et al., 2009; Dennis, 2012; Denton et al., 2011; Hock et al., 2009; Lesaux & Kieffer, 2010; Ritchey et al., 2015; and Tolar et al., 2014). As an illustration of an observed discrepancy across the definition, measurement, and analysis, in Savage's (2006) comprehensive analysis of the SVR with 15-year-olds with limited reading proficiency, he defined and measured fluency as accuracy and rate, and used the term *fluency* in one of five hypotheses; however, the results of the rate measure was only used in descriptive

statistics, and when he tested for the hypothesis involving fluency, he only analyzed the results of the accuracy measure.

Oral reading fluency as accuracy, rate, and prosody. Least common were definitions that included prosody (i.e., reading with expression; Paige, 2011; Paige, Rasinski, & Magpuri-Lavell, 2012; Paige et al., 2014; and Tilstra et al., 2009). In addition to using WCPM with passages and other standardized measures of rate and accuracy, both Paige et al. (2012 & 2014) studies included the Multi-Dimensional Fluency Scale to assess prosody, a less frequently used and studied facet of ORF. This scale, adapted from Zutell & Raskinski (1991), is a rubric measuring expression and volume, phrasing, smoothness, and pace while reading aloud. While Tilstra and colleagues (2009) included prosody in their ORF definition, they assessed it as WCPM only and did not include prosody in their research questions. In Paige's earlier study (2011), he combined three indicators of sight word efficiency, phonemic decoding, and passage reading to represent the construct of oral reading proficiency.

All studies measured ORF during passage reading, but some studies also included rate of words read in lists. Studies by Clemens et al. (2017), Tighe & Schatschneider (2014), and Tilstra et al. (2009) defined ORF as reading connected text, and measured and analyzed results as such. Several researchers measured word reading and passage reading as distinct skills and examined their study results in like fashion (Adolf et al., 2006; Brasseur-Hock et al., 2011; Cirino et al., 2013; Clemens et al., 2019; Denton et al., 2011; Eason et al., 2013; Hock et al., 2009; Paige et al., 2014; Ritchey et al., 2015; and Tolar et al., 2014). Three studies illustrated why distinguishing between these definitional parts is important. Cutting and Scarborough (2006) viewed assessment results of these parts separately and determined that rate and accuracy of words read in isolation (as they call bottom-up skills) can be predictive of comprehension, depending on the format and requirements of the comprehension measure. Their findings indicated that most variance in RC was consumed by word recognition and decoding as well as oral language proficiency (i.e., linguistic comprehension); however, reading speed added a small, but still significant additional variance of 1-6 percent on their three selected measures of

comprehension. Ritchey et al. (2015) found only Passage Reading Fluency and Spelling Fluency among many reading skills, including words read in isolation, as measured in 4th grade added variance to their model predicting reading difficulties in 6th grade. However, in a study on the skill moderators of a reading intervention, Clemens et al. (2019) found that students with lower ORF (not lower word reading nor vocabulary) at pre-test reaped the benefits of an intervention teaching word reading, reading fluency, and vocabulary as shown by higher RC scores than their classmates with higher ORF at pre-test or comparison students receiving no intervention.

In contrast, in some studies, there were inconsistencies between the provided definition, selected measures, and how relationships were analyzed, specifically related to whether ORF represents reading word lists and reading passages or only reading passages. For example, the definition provided by Cutting et al. (2009) could be interpreted as passage reading or word list reading; they measured both facets, but their results distinguished word recognition and contextual ORF. Yet, Kershaw & Schatschneider (2012) defined ORF as both reading in isolation and in passages, and only measured ORF with passage reading. In another example, while the definitions provided by Dennis (2012) and Lesaux & Kieffer (2010) could also be interpreted as either or both passage reading or words in isolation, they measured both skills with different measures, and combined the skills under one construct in their analysis. An example potentially causing semantic confusion for readers, Paige et al. (2012) address ORF as "word recognition automaticity, the ability to recognize words in text so effortlessly…" (p. 68) and prosody. They measured the former as automaticity in passage reading (not words read in a list as other researchers seem to mean when they use the terminology *word recognition*). Words read in isolation as a means to measure ORF may be problematic as it is also representative of word recognition.

Reading comprehension. As with fluency execution, multiple mental tasks are taking place simultaneously in order to comprehend text. Reading comprehension includes the interaction of thinking skills and knowledge while deciphering text independently in order to make meaning. Some researchers in these reviewed studies included linguistic or language

comprehension in addition to RC as a separate construct; however, Dennis (2012) combined these reading skill components into one construct she entitled *meaning*. Whereas Clemens et al. (2019) used three distinct assessments, each measuring reading comprehension.

Performance on traditional, commercial tests of RC commonly include answering questions or recalling key parts after reading a passage, which are criticized to represent only simple or surface level comprehension (Snow, 2018). Means for assessing RC varied widely in the reviewed studies (see Appendix available online); however, two measures were most common. Eight studies used the Passage Comprehension subtest of the Gray Oral Reading Test (GORT) as one of their standardized assessments of RC (Adolf et al., 2006; Brasseur-Hock et al., 2011; Clemens et al., 2019; Clemens et al., 2017; Cutting & Scarborough, 2006; Cutting et al., 2009; Eason, et al, 2013; and Hock et al., 2009). Many of these same studies, plus a few other studies, used the Gates McGinite Reading Test, known to have more inferential questions and a balance between narrative and expository than other standardized RC assessments (Clemens et al., 2019; Clemens et al., 2017; Cutting & Scarborough, 2006; Gelbar et al., 2018; Lesaux & Kieffer, 2010; Ritchey et al., 2015; and Tilstra et al., 2009).

Substantive Findings

ORF adds variance to the Simple View of Reading model for ALRP. The Simple View of Reading (SVR) was delineated as a model in Hoover & Gough's 1990 study that found when early readers have partially developed reading skills, two overt components—decoding and linguistic comprehension—have an additive and multiplicative effect on RC. At that time, the authors did not discuss implications of their theory for adolescents who continue to struggle with RC. Nevertheless, more than half of the reviewed studies (13 of 22) relied on the SVR as their theoretical framework, and the research purpose for five of these studies was to examine the role of ORF within the SVR model (Adlof et al., 2006; Savage, 2006; Cutting & Scarborough, 2006, Kershaw & Schatschneider, 2012, Tilstra et al., 2009). Theoretical frameworks identified for each study can be found on the Appendix online.

In reviewed studies with early and older readers, mixed results related to the role of ORF within the model were found. The study by Adlof et al. (2006) suggested ORF (as measured by rate) did not need to be added to the model. In contrast, Cutting & Scarborough's (2006) study indicated that contributions of decoding and linguistic comprehension to RC varied by the type of RC measure used; however, additional variance was found once passage ORF (as measured by rate) was added to the model for 1st through 10th graders with reading and language deficits. Similarly, Kershaw & Schatschneider (2012) found that passage fluency (accuracy and rate) correlated with RC after controlling for decoding and linguistic comprehension, and that this correlation decreased with the age of subjects (3rd, 7th, and 10th graders).

Depending on how decoding is measured, the SVR may predict RC differently. In an evaluation study of the SVR for ALRP, Savage (2006) found that if decoding is measured as nonword reading, then the SVR model holds, but if decoding is measured as oral reading *accuracy* in passage reading, then verbal ability (rather than linguistic comprehension) along with decoding is a better predictor of RC, disrupting the model. Additional regression analysis from this study showed that decoding and linguistic comprehension together explained around 66 percent of the variance in RC, suggesting there may be other factors to explain unique variance in reading comprehension in ALRP. For instance, Tilstra et al. (2009) showed that the combined variance provided by verbal proficiency and oral reading fluency (as measured as accuracy and rate) increased the explanatory power of the SVR model.

To note, none of the studies examining the role of ORF in the SVR included prosody in their definition and measurement of ORF. According to Hoover and Gough, decoding is efficient word recognition, and linguistic comprehension includes other skills that exist outside reading, such as skills required in thinking, analyzing, reflecting, and problem-solving. Interestingly, even though Paige et al. (2014) defined and measured ORF as including rate, accuracy, and prosody in their study, their explained interpretation of the SVR included ORF as an assumed facet of decoding.

ALRP have distinct reader profiles. Across several studies, most of the reading component scores for ALRP were below average with individual differences in reading skills (e.g., ORF, decoding, vocabulary) likely leading to their lack of proficiency with RC (Brasseur-Hock et al., 2011; Cirino et al., 2013; Clemens et al., 2019; Clemens et al., 2017; Cutting et al., 2009; Dennis, 2012; Lesaux & Kieffer, 2010; Tilstra et al, 2009). Two studies using similar methods of cluster and latent class analysis (Dennis, 2012; Brasseur-Hock et al., 2011) categorized non-proficient readers into four or five distinct profiles (see Table 3), respectively, suggesting heterogeneity in the strengths and weaknesses of ALRP (e.g., low accuracy, yet average rate). When considering the results of these two studies side-by-side, it is important to note that Dennis' study compares struggling readers to each other rather than to normed standard scores as is the case in the Brasseur-Hock et al. study (2011). This means that the four clusters outlined by Dennis (2012) reveal reader profiles for higher or lower than the mean of the sample. As a point of emphasis, when considering the profiles of readers with *higher than the mean* for comprehension, these readers are nevertheless comprehending below average in comparison with all readers. Whereas, the Brasseur-Hock et al. (2011) include a profile for readers who are low across all reading skill components when compared to normative scores for readers of all skill levels, finding adolescents with (a) significant skill weaknesses, (b) global skill weaknesses, (c) dysfluent readers, (d) knowledge weaknesses, and (e) reading strategy weaknesses.

Table 3

Examples of Distinct Profiles for Adolescent with Limited Reading Proficiency

Four Clusters (Dennis, 2012)	Five Clusters (Brasseur-Hock et al., 2011)
• *Slow and Steady Comprehenders*: much higher than the mean of the sample for comprehension, but slightly lower than the mean for decoding and rate	• *Severe Global Weakness*: low across all reading skill components • *Moderate Global Weakness*: slightly higher reading accuracy and reading

- *Slow Word Callers*: much higher than the mean for decoding, slightly higher than the mean for comprehension, and much lower than the mean for rate
- *Automatic Word Callers*: much lower than the mean for comprehension, much higher than the mean for decoding and slightly higher than the mean for rate
- *Struggling Word Callers*: slightly lower than the mean for comprehension, much lower than the mean for decoding, and slightly higher than the mean for rate

fluency, but similar language comprehension

- *Dysfluent Readers*: below average on all reading component skills, but fluency is lowest
- *Weak Language Comprehenders*: average reading accuracy and fluency, but low comprehension
- *Weak Reading Comprehenders*: average fluency, but low language comprehension

In other studies, also using latent class analysis, ALRP had varied scores across multiple reading skill components. Lesaux & Kieffer (2010) found that ALRP classified as language minority learners and English speaking were evenly distributed among three skill profiles of struggling readers (i.e., slow word callers, globally impaired readers, and automatic word callers); all of whom were characterized by low vocabulary scores and having achieved basic fluency skills. Yet, Clemens et al. (2017) found that almost all ALRP have deficits in either or both ORF or vocabulary knowledge with the largest subgroup having deficits in both. In another study indicating the influence of multiple variables, Tilstra et al. (2009), using multiple regression models in a sample of varied reader abilities, found that verbal proficiency and ORF added a twenty-two percent increase in explained unique variance, beyond that of decoding and linguistic comprehension, in RC.

Dennis (2012) points out that ALRP "cannot be viewed through a deficit model that assumes these students struggle with reading because they have not yet developed constrained skills" (p. 18), rather it is the complex interaction of these skills into simultaneous execution that yields comprehension. The compilation of these particular studies suggests the predictive nature of ORF to RC is ambiguous due to the potential range of ORF scores and interaction of multiple reading component skills among adolescent readers.

ORF is comprised of more than automaticity. Several studies suggest that if ORF is measured solely by automaticity (i.e., accuracy and rate combined) to predict RC, then its predictive power is limited or confounded by extraneous variables. In some studies, on the relationship between ORF and RC, other variables were included, such as extrinsic motivation, prosody, and linguistic comprehension. In 2011, a study by Paige, using structural equation modeling, showed all paths from extrinsic motivation to ORF (as measured by accuracy and rate only, not prosody) to RC to academic achievement for ALRP are significant.

Paige and colleagues (2012; 2014) examined the importance of prosodic reading to RC in secondary students. These researchers claim that prosody is an often-missing component of the definition of fluency. Prosody simultaneously influences and reflects a reader's level of understanding while reading aloud or silently. Paige et al. (2012) points out that while prosody can be measured when reading occurs orally, prosody still takes place during silent reading. In 2014, Paige and his colleagues proposed a tandem theory of reading that assumes the purpose of reading is to comprehend, not just for reading aloud, such as to a child or for an assessment. When the goal of reading is to comprehend and sufficient meta-cognitive skills are in place, then accuracy and prosody maximize comprehension possibilities, whereas rate's benefit is solely the reader's choice to optimize his or her comprehension. This is supported by their finding that as students' average scores for oral prosody increased, so did their comprehension scores.

Similarly, two studies examined the influence of linguistic comprehension on ORF. Eason and colleagues (2013) found that oral language, particularly vocabulary and semantics, provides unique variance to ORF, making it seem more logical to associate ORF with linguistic

comprehension. Separately, Kershaw and Schatschneider (2012) pointed out the possibility that "variance associated with the passage fluency construct could be associated with the construct of linguistic comprehension, as passage fluency is likely influenced by both the ability to decode and the ability to understand the text as it is being read" and recommended checking for a correlation between these two constructs prior to assuming their unique variance (p. 462).

The role of fluency varies. ORD predicts RC to varied degrees for different stages in reading development. For example, Tilstra et al. (2009) found that the predictability of ORF for RC was similar across upper elementary through high school readers, yet the role of decoding decreased across the years. They assert that the purpose of fluency for younger readers is to accurately and quickly decode words, yet for older readers, fluency helps them understand text as well, "reflecting proficiency in both decoding and comprehension" (p. 397). On the other hand, Tighe and Schatschneider (2014), found that fluency was most predictive of RC for third graders; both fluency and reasoning served as similar predictors for seventh graders; and reasoning was the only significant predictor for tenth graders. Moderate correlations between fluency and comprehension are found for older readers, which are weaker correlations than those reported for younger readers (Denton et al., 2011; Kershaw & Scatschneider, 2012). Based on their findings, Gelbar and colleagues (2018) suggest that ORF may not be a significant predictor of RC for adolescent readers because of the increased number of multisyllabic words in grade level text and an increased influence of prior knowledge.

Several studies found that relationships among reading component skills varied when variables for text type were itemized and when multiple measures for RC were used (Cutting & Scarborough, 2006; Cutting et al., 2009; Denton et al., 2011; Eason et al., 2013; Paige et al., 2014). For example, Eason's research team (2013) in their study to clarify the relationship between word reading efficiency and ORF to RC included varied measures of reading comprehension. They found that the amount of variance changed for word reading efficiency and ORF depending on the RC measure used. These findings indicate a need for comprehension measures used at the secondary level to match the realistic demands of reading tasks to be valid

for making instructional and placement decisions. Furthermore, in a study by Cutting et al. (2009), groups of students with *specific reading comprehension deficits* and *general reading disability* scored higher or lower than each other on reading component skills based on the RC measure used. Finally, in a study by Tolar and colleagues (2014), examining the predictability of varied progress monitoring slopes to different outcome measures (e.g., fluency, comprehension), found that slope validity was greatest when progress monitoring measures were aligned with the outcome. More specifically, their results showed that ORF was generally not a significant predictor of RC.

ORF has tenuous predictive value. All reviewed studies included diverse readers, and results suggest that proficient and non-proficient readers have heterogeneous profiles. Adolescents with low RC performance had below average scores across multiple reading skill components, sometimes including ORF (Adolf et al., 2006; Cirino et al., 2013; Clemens et al., 2017; Cutting et al., 2009). More specifically, Cirino and colleagues (2009) examined connections between decoding and fluency across readers with varied comprehension abilities, and their findings indicated "that fluency is more related to decoding in struggling readers, whereas it is more related to comprehension in typical readers" (p. 1079). Their study found that only 12 percent of readers struggling with comprehension had only a comprehension issue and that 68.2 percent had difficulty in more than one domain (e.g., decoding, ORF, silent reading fluency, comprehension). Furthermore, results from Clemens et al. (2017), showed a small portion (20 percent) of their sample to be readers with adequate fluency and low comprehension. The compilation of results from these studies may mean that if an adolescent can read fluently, then he or she will have average comprehension.

However, it is important to emphasize that one cannot assume low comprehension when ORF is low. Hock et al. (2009) found that ALRP had similarly below-average means for several reading skill components, and that proficient readers also had varied profiles. In a more recent study, Gelbar et al. (2018) found that some secondary students with dyslexia (i.e., low phonological processing abilities and average linguistic comprehension) achieved RC scores that

are comparable to their same age peers. Their study examined three predictors—study strategies, ORF, and cognitive ability—and found only cognitive ability as a significant predictor. Adlof et al.'s study also showed readers with rate deficits and within normal limits comprehension (2006). These findings suggest that a proficient reader can score below average for ORF, yet average for RC.

Additionally, two studies provide nuanced perspectives on this point in that ORF may predict general reading ability and a need for reading intervention in some regard. Ritchey et al. (2015) investigated which 4th grade measures predict 6th grade reading problems and found that among many reading component skills assessed in 4th grade, passage reading fluency and spelling fluency were statistically significant (area under the curve [AUC] = .91) to predicting identification as having reading difficulties in 6th grade as shown by RC scores. In a study by Clemens et al. (2019) to examine whether pretest skills moderated the effects of a multicomponent reading intervention, their results suggest that readers with low ORF scores at pre-test benefit more from an intervention targeting word reading, reading fluency, and vocabulary, as shown by increased RC scores at post-test. Of import, these same readers did not show improvement in their ORF. Thus, this study informs us about the potential for ORF to alert educators to a general reading ability issue; however, not to establish a direct relation between ORF and RC. In sum, although some are less common there exist multiple paths to average and above-average reading comprehension as the visual in Figure 1 displays, concluding that one measure of ORF cannot determine definitively that a comprehension issue exists.

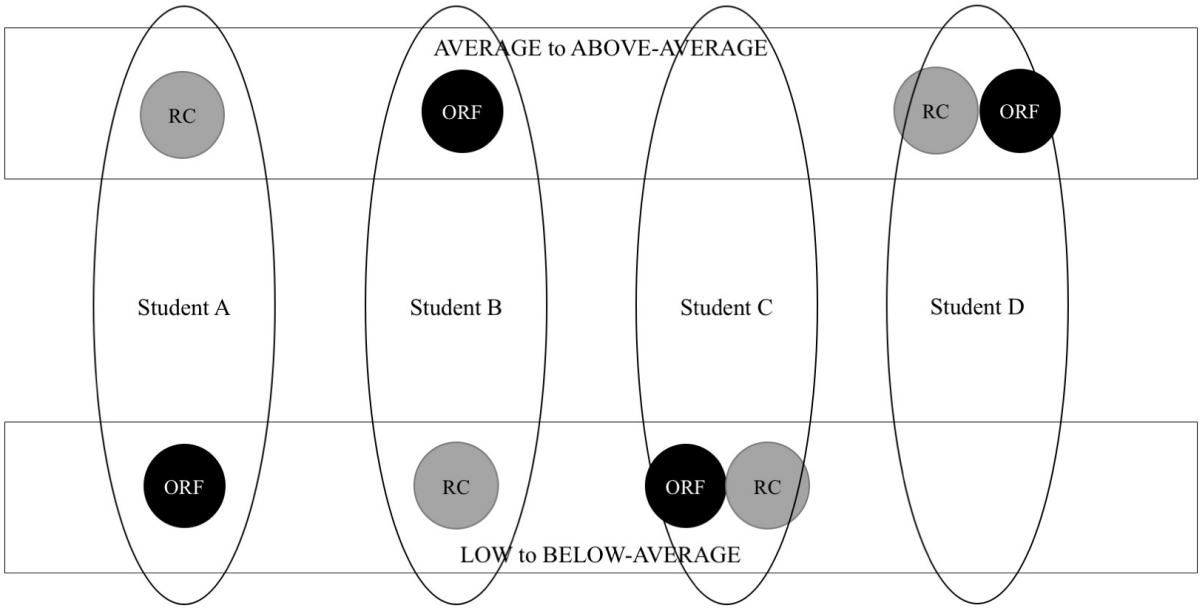

Figure 1. Multiple Paths to Reading Comprehension

Discussion

This systematic literature review is the first synthesis of empirical findings on the relationship between ORF and RC for ALRP. Although a correlational relationship between ORF and RC exists, the extent to which ORF predicts RC and its measurement as a single score to determine readers' needs is limited. Measurement of a reader's development, at a certain point, surpasses merely the need for assessing ORF (as frequently defined by practitioners and assessment tools as accuracy and rate) because readers employ a complex array of skills in order to comprehend text (e.g., Kershaw & Schatschneider, 2012; Tighe & Schatschneider, 2014; Tilstra et al., 2009) and adolescents have fewer opportunities for oral reading. Low ORF may indicate a need for continued general reading skill development (Clemens et al., 2019; Ritchey et al., 2015); however, a reader may develop RC proficiency and continue to lack ORF proficiency (Gelbar et al., 2018), suggesting the need for more comprehensive assessments of ALRP. Finally, some ALRP will likely have developed partial success in all reading skill components (e.g., Brasseur-Hock et al., 2011; Cirino et al., 2013; Clemens et al., 2017; Dennis, 2012; Lesaux & Kieffer, 2010). The intersection of results from included studies indicate several complications

with allowing ORF to play a dominant role in making instructional decisions related to an adolescent reader's comprehension abilities.

A first complication is that ORF is one reading component skill among many that interact to result in RC, and this one facet is likely comprised of more than accuracy and rate. Depending on the combination of reading component skills tested to predict RC, ORF as well as varied measures of decoding and verbal proficiency added variance to the SVR model (Cutting et al., 2006; Kershaw & Schatschneider, 2012; Savage, 2006). Additionally, outside the results of this review there is agreement that an intact ORF construct includes prosody. If three component skills—decoding, fluency, and linguistic comprehension—contribute to RC, then measurement of accuracy and rate should not be relied upon as a sole predictor for comprehension. By this point in their reading experience, adolescents may have learned varied skills related to the reading process, some with success and some with challenges; therefore, the potential exists for there to be multifaceted strengths and weaknesses in their reader profile. Struggling readers were found to be low across multiple reading skill components (e.g., Brasseur-Hock, 2011; Dennis, 2012; Lesaux & Kieffer, 2010), and for some proficient readers ORF is the lowest score in their reader profile (Hock et al., 2009). Diagnosis of their reading needs must be based on a comprehensive assessment protocol.

A second complication is due to the complexity of RC. Reading comprehension is a complex process, and demands across text change. Eason et al. (2013) found that while ORF provided unique variance, the amount changed depending on the RC measure. Given varied demands of text adolescents are expected to read (e.g., use of academic vocabulary and text structure) and the complexity of comprehension (e.g., higher level thinking, self-regulatory monitoring and executive functioning skills), then the rate component of fluency may fluctuate with necessity. Different task demands and purposes for reading will require a reader's emphasis on varied aspects of fluency (International Literacy Association, 2018). This may mean prosody is a facet of ORF that more closely represents a reader's comprehension; however, as shown in

this review, only two studies, both by Paige et al. (2012 & 2014), included prosody as a subpart of ORF, bringing into question the construct validity of ORF in nearly all of the other studies.

A third complication is related to the causes and effects of below-average ORF. The causes of below-average ORF will help drive instructional decisions, yet effects of below average ORF vary. When ORF does contribute to RC, it may be explained by oral language abilities, specifically vocabulary and semantics (Eason et al., 2013). For example, other variables may influence an older reader's ORF and RC as multisyllabic words require abstract understanding beyond the ability to pronounce them, such as vocabulary knowledge, prior knowledge, and cognitive ability (Gelbar et al., 2018; Pikulski & Chard, 2005), and motivation for reading contributes to ORF (Paige, 2011). Contributing factors (e.g., decoding, oral language) to ORF may or may not have unique variance, and correlations and measurement decisions for these reading skill components must be considered. However, for individual students, these same skills may *not* correlate, so multiple measures are needed to isolate reading issues, if it is possible to do so. Furthermore, since proficient readers have varied profiles as do struggling readers (Hock et al. 2009), a fluency score alone is not enough to indicate a comprehension issue. Thus, the uniqueness of a reader's profile increases as their experiences with reading increase.

An Extension of the Simple View of Reading

Given the common practice of anchoring reading research on the SVR and the frequent use of ORF as a variable to measure the effectiveness of reading interventions, the potential connection between ORF and the SVR for adolescents will support accurate applications. For RC to occur, the SVR proposes that neither decoding nor linguistic comprehension is sufficient by itself (Hoover & Gough, 1990). For beginning readers, numerous studies show that decoding and linguistic comprehension combined provide much of the variance in the model, leaving little variation remaining to be explained by other variables (Garcia & Cain, 2014). However, the model also suggests that varied competence in either component can still yield comprehension, and in studies with older readers there is room for variance to be explained by other factors (Savage, 2006; Kershaw & Schatschneider, 2012). This means that continued improvement in an

area of strength could continue to increase the outcome variable. For example, strengthening linguistics could increase RC, even when decoding instruction is minimal as long as decoding skills exist (i.e., not zero). However, even though decoding is not zero, it still needs to be sufficient enough to ease cognitive efforts away from strenuous decoding to allow the mind to process and comprehend. Perhaps, ORF has an indirect effect on RC through its direct effect on decoding and listening comprehension.

Fluency has been considered a bridge between *decoding* and *reading comprehension* (Pikulski & Chard, 2005). However, given the results of this review, ORF may serve as a bridge between *decoding* and *linguistic comprehension* yielding in *reading comprehension*, particularly when ORF is interpreted as an adjustable rate to coincide with a reader's understanding of the text, as shown in Figure 2. Furthermore, the relationships are an expansion of the two required components of the reading process according to the SVR to yield RC (decoding and linguistic comprehension) to show how accuracy, rate, and prosody are involved in the overall reading process. Given the assumptions of the Tandem Theory of Reading (Paige et al., 2014), a reader may show less prosodic (e.g., inarticulate, choppy) reading to increase accurate decoding of words, yet as linguistic comprehension causes recognition of words and sentences, the same reader may show more prosodic (e.g., fluid, expressive) reading as automaticity increases. Specifically, the accuracy component of fluency has an interaction with decoding, and automaticity is influenced by linguistic comprehension. In other words, decoding is more fluid when linguistic comprehension is occurring, and linguistic comprehension comes easier when decoding is effortless. This may signify that decoding and linguistic comprehension are linked by the specific reading component skill of prosody.

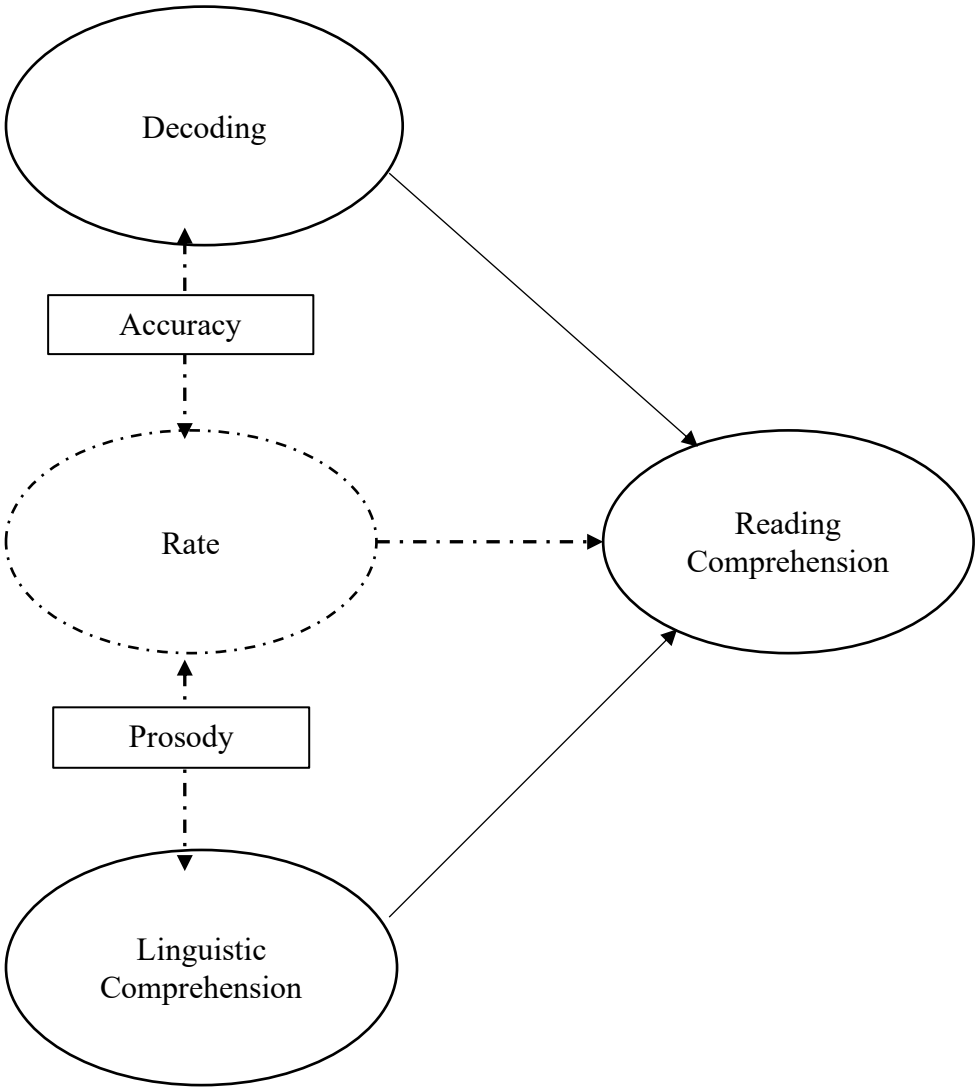

Figure 2. Relationships Among Reading Component Skills

Limitations

A limitation of this review is that it sought to learn the relationship between ORF, a single reading component skill, and RC, as measured by a standardized assessment. Many reviewed studies also involved the examination of other predictors (e.g., Cutting et al., 2009), but their findings were not fully synthesized in this review. While it is impossible to include all extraneous variables predicting RC in a statistical model, in these studies, it was possible to view the influence of some other variables believed to attribute to the outcome. For ALRP, another,

more relevant and efficient sole predictor of RC may be found, particularly in consideration of Tolar et al.'s (2014) finding that progress monitoring tools closely aligned with outcome measures have greater predictive value. Additionally, it would be useful to analyze changes in reading skill development, particularly oral and silent reading fluency in the primary grades through high school. Lastly, there are other studies with insights on this topic that used researcher-adapted passages from reliable sources and researcher-made multiple-choice questions, rather than standardized RC measures (e.g., Saenz & Fuchs, 2012).

Implications

Given the lack of progress for adolescent readers nation-wide and the urgent need for their improved literacy which drives success in all other areas, the findings of this review provide crucial direction to practitioners, policy makers, researchers, and assessment developers. When adolescents have dysfluent oral reading, educators may misjudge their true knowledge and abilities. The results of this literature review extend and confirm the theoretically based conclusions drawn by Kuhn et al. (2010) that researchers continue to measure an incomplete conceptualization of ORF. Because educational researchers embrace the potential to establish a basis for practices in schools, and because what is emphasized over time becomes habit, these results serve as a call to action for researchers is be more intentional about construct definitions, measurement selection, and interpretation of results in order to prioritize meaning over efficiency. Specifically, knowledge of an adolescent's oral reading automaticity provides helpful information about his or her reading profile, but is not sufficient, as a sole measure, to determine an intervention agenda, that a student's reading comprehension is a concern to be addressed, nor predict performance on a RC assessment.

Due to varied reader profiles and the complexity of comprehension, schools need to use multiple assessments to determine intervention needs and to develop research-based understandings of the path to proficient reading at the secondary level. As an example, an adolescent who performs poorly on a measure of ORF may or may not need word-level intervention, and only by administering additional measures of word reading efficiency would

the instructional needs be clarified (Eason et al., 2013). This reader may need a comprehensive reading intervention that includes decoding; however, this would only be known by assessing multiple reading skill components through a diagnostic process (see Washburn & Billingsley, 2018, for detailed examples of using multiple data points and a collaborative approach to decision making related to literacy). Additionally, all reading skill components work together, meaning a reader will not have strong RC with adequate ORF alone. Measuring fluency alone will not inform others how well a reader is comprehending. Nevertheless, researchers' findings suggested that fluency serves as a bridge to proficiency (e.g., Cirino et al., 2013) and should be part of instruction or intervention as does the National Reading Panel's recommendation for comprehensive literacy instruction. When multiple constructs are considered and measured, a more complete picture of the struggling reader is visible, and our field, teachers, and school systems in the U.S. need to make progress in taking a more holistic approach.

Practitioners and policy makers will benefit when researchers learn more about the relationships among reading component skills with future empirical studies. Most of the reviewed studies did not distinguish between different goals for reading (i.e., to read aloud for an assessment, to comprehend for pleasure, to comprehend discipline-specific expository text). The study by Eason et al. (2013) found that the amount of variance changed for ORF depending on the RC measure, yet the study by Cutting and Scarborough (2006) found that the inclusion of reading speed, as added to decoding and oral language, improved predictability of RC regardless of the measure. For adolescents, RC is the desired outcome, supported by strong general reading ability in typically performing readers; however, for struggling older readers, RC may be achievable regardless of how unwieldy their general reading ability may be. Thus, future research on adolescents with limited reading proficiency could compare the role of ORF on general reading ability versus RC of varied text.

As another example for research and assessment development, measuring fluency, as it is currently most often defined as rate and accuracy, is efficient. In a recent brief by the International Literacy Association (2018), this point is clear in their title that *Reading Fluently*

Does Not Mean Reading Fast. Adolescent literacy researchers and practitioners need other predictors or methods to determine which adolescents need additional reading instruction outside the typical core classroom experience and to monitor their progress. This review shows there is limited empirical evidence on the use of prosody as a reading component skill to represent meaning making while reading. Furthermore, additional research about the mediating effect of prosody on the relationships proposed in the SVR as well as the interaction of reading component skills for ALRP in relation to the SVR is needed. In general, the SVR is useful for designing studies and interventions; however, particularly for those focused on adolescents, there are other theoretical frameworks which may be needed in combination with or in addition to the SVR due to their inclusion of text type and features, and diverse interpretations of reading proficiency (Francis, Kulesz, & Benoit, 2018; Snow, 2018). Lastly, research on varied profiles of average and above average readers, to include a look at their fluency levels, would be useful for goal setting with adolescents with limited reading proficiency.

Finally, the 2015 Every Student Succeeds Act (ESSA) offers states, and therefore schools, an opportunity to change their approach to literacy assessment and instruction. The ESSA includes new flexibility over NCLB and encourages states to take a more holistic approach to school accountability. National and state level curriculum designers as well as school administrators influence movement on adolescent reading progress. For example, the Common Core State Standards and college and career readiness standards have increased emphasis on adolescent literacy per content area. At the secondary level, students learn varied disciplines from distinct teachers and special educators have limited opportunities to teach foundational reading skills (Leko, Chiu, & Roberts, 2018); therefore, systematic literacy instruction must be accomplished differently in middle and high schools than in elementary schools (International Reading Association, 2012). When policy makers acknowledge that comprehending disciplinary-specific text is the execution of multiple sophisticated skills, then they would find it reasonable and necessary to dedicate time in the upper grades for continued development, specifically targeting ALRP, but also as a school-wide focus to emphasize the

thinking skills needed for disciplinary literacy. Not only is reading required for learning in all disciplines, but also for survival, self-preservation, and self-directed promotion in today's world; thus, it is imperative for schools to figure out the best means for achieving their essential goals.

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Appendix

Characteristics of Reviewed Studies

Author(s), Year	Study Platform	Method	Results
Adlof et al., 2006	**Research Purpose:** to determine whether a fluency component should be added to the Simple View of Reading **Theoretical Framework:** SVR **Definition of ORF:** Rate of connected text and rate of single word reading	**Sample Characteristics:** *n* = 604 2nd, 4th, and 8th graders (276 non-impaired; 328 language impaired) **Measures:** • ORF: GORT-3 Rate subtest (connected text rate); TOWRE Sight Word Efficiency and Phonemic Decoding Efficiency subtests (single word rate) • RC: WRMT-R Passage Comprehension subtest; GORT-3 Comprehension subtest; QRI-2 RC subtest • Other skills measured: listening comprehension; accuracy **Statistical Approach:** Concurrent and predictive structural equation modeling (SEM) and profile analysis	• few individuals had problems in fluency separate from word recognition accuracy or listening comprehension • the correlation decreased across grades for word recognition and RC, whereas it increased for listening comprehension and RC • fluency did not account for unique variance in RC • mean comprehension for children in the rate deficit group was well within normal limits
Brasseur-Hock et al., 2011	**Research Question:** Do adolescents with below-average comprehension exhibit differentiated profiles of component reading skills including word reading accuracy, word-level and passage-level fluency, and oral language?	**Sample Characteristics:** *n* = 319 beginning 9th graders (minimum of 55 students per reading achievement level) **Measures:** • ORF: TOWRE Sight Word Efficiency and Phonemic	• adolescents with below-average comprehension were divided into five distinct skill profiles, indicating substantial heterogeneity in component skills

	Theoretical Framework: SVR **Definition of ORF:** pace, accuracy, and rate **Note:** The definition was inferred by how the ORF construct was measured by three assessments.	Decoding Efficiency subtests; GORT-4 Fluency (Rate and Accuracy subtests combined) • RC: WLPB-R Passage Comprehension subtest, GORT-4 Passage comprehension subtest; Kansas State Assessment reading subtest • Other skills measured: listening comprehension; reading achievement; word level (decoding and word identification); vocabulary (receptive and expressive) **Statistical Approach:** Latent class analysis (LCA)	• a single measurement of RC did not provide accurate and precise classification of the source of a students below-average comprehension • fluency skills vary and do not correlate with other reading component skills
Cirino et al., 2013	**Research Hypothesis:** 1. Although we expect reader groups to have different latent means, we expect that measures assessing reading components do so in the same manner in both types of readers. 2. Among struggling readers, we expect that the vast majority of these students will have difficulties in one or more external reading measures in multiple areas rather than in comprehension alone, and we expect that a sizeable proportion will have weaknesses with basic decoding skills. **Theoretical Framework:** SVR **Definition of ORF:**	**Sample Characteristics:** *n* = 1,748 6th, 7th, and 8th grade students were oversampled for struggling readers (1,025 struggling readers) **Measures:** • ORF: TOWRE Sight Word Efficiency and Phonemic Decoding Efficiency subtests; Texas Middle School Fluency Assessment Passage Fluency and Word Lists subtests • RC: GRADE Reading Comprehension subtest; WJ-III Passage Comprehension subtest; Texas Middle School Passage Comprehension subtest	• of the 84% who struggled with comprehension, only 12% had *only* a comprehension issue. Considering the whole sample of struggling readers, 68.2% had difficulty in more than one domain. • Comprehension and fluency measures yield different findings in struggling versus typical readers • fluency is more related to decoding in struggling readers, whereas it is more related to comprehension in typical readers, though these

	speeded reading of words in isolation and in a passage **Note:** The above definition was inferred by how ORF was measured.	• Other skills measured: decoding; combined fluency and comprehension **Statistical Approach:** multi-group confirmatory factor analysis	correlations are difficult to compare, since the way these factors are indexed varies across groups
Clemens et al., 2019	**Research Purpose:** to investigate whether pretest skills, including word-reading fluency, text-reading fluency, and vocabulary knowledge, moderated the effects of a multicomponent intervention on the reading comprehension skills of students in Grades 6 through 8 **Theoretical Framework:** several frameworks were referenced; includes SVR **Definition of ORF:** reading connected text with ease and efficiency	**Sample Characteristics:** n = 226 6th-8th graders with low achievement on a reading accountability assessment **Measures:** ORF: easyCBM and Sight Word Efficiency (SWE) from TOWRE-2 RC: GRMT Comprehension subtest, GRADE Comprehension Scale, and GORT-5 Comprehension • Other skills measured: vocabulary **Statistical Approach:** main effects model as base with moderation effects analysis	• pretest sight word reading and vocabulary were not statistically significant predictors of posttest comprehension and did not demonstrate statistically significant interaction effects with intervention condition • pretest ORF demonstrated a statistically significant interaction with condition ($\beta = -0.116$, $p = .03$), indicating pretest reading fluency moderated the effects of intervention condition • a negative effect indicates that as students' pretest ORF scores decreased, a greater effect of the CCT intervention was observed (and vice versa).
Clemens et al., 2017	**Research Questions:** What percentage of students with low RC also demonstrate low reading fluency and/or vocabulary knowledge?	**Sample Characteristics:** n = 180 students, grades 6-8; RC difficulties; SWD and ELL included	• of the struggling readers, the majority were either below-average in both fluency and vocabulary or below-average

	Theoretical Framework: several frameworks were referenced; includes SVR **Definition of ORF:** effortless and automatic reading of words in connected text	**Measures:** • ORF: Passage Reading Fluency probe from the easyCBM system • RC: GMRT-4 Comprehension subtest; GRADE Comprehension subtest; GORT-5 Comprehension subtest • Other skills measured: vocabulary **Statistical Approach:** latent class analysis	in fluency but average in vocabulary • low RC but adequate scores in reading fluency or vocabulary represented only a very small portion of the sample
Cutting & Scarborough, 2006	**Research Questions:** 1. Do the contributions of word recognition/decoding and oral language skills to RC depend on the measure of comprehension that is used? 2. Beyond word recognition/decoding and oral language, do other skills account for additional variance in RC as measured by different tests? 3. Do the relative contributions of various predictors of comprehension differ for readers with differing levels of reading skills? **Theoretical Framework:** SVR **Definition of ORF:** reading speed of isolated words and words in context	**Sample Characteristics:** *n* = 97 students, grades 1.5-10.8; with reading and language deficits **Measures:** • ORF: GORT-3 Rate subtest • RC: Reading Comprehension subtests from GMRT-R, GORT-3, and WIAT • Other skills measured: word recognition/decoding; oral language; rapid serial naming; full-scale IQ; verbal memory; attention **Statistical Approach:** hierarchical multiple regression analyses	• relative contributions of word recognition/decoding and oral language skills to comprehension varied from test to test • simple model plus reading speed appears to predict RC, regardless of the measure of comprehension used • inclusion of reading speed in regression analyses improved prediction significantly, accounting for an additional 1%-6% of the variance on the three measures of RC
Cutting et al., 2009	**Research Purpose:** to further understand, within a neuropsychological framework, the role of fluency of reading words in isolation and in context, oral language proficiencies, and executive function	**Sample Characteristics:** *n* = 56 9- to 14-year-old children [21 typically developing (TD), 18 GRD, and 17 S-RCD] **Measures:**	• TD and S-RCD participants read isolated words at a faster rate than GRD participants; however, both RD groups had contextual

	on reading comprehension performance in typically developing (TD) students, those with general reading disability (GRD), and those with specific reading comprehension deficits (S-RCD). **Theoretical Framework:** neuropsychological framework **Definition of ORF:** word reading speed	• ORF: TOWRE Sight Words and Phonemic Decoding subtest (isolated word reading), GORT-4 Fluency (Rate and Accuracy subtests combined) • RC: Comprehension subtests from the GORT-4 and WRMT-R/NU • Other skills measured: oral language; executive function; full-scale IQ **Statistical Approach:** multivariate analyses of variance (MANOVAs), hierarchical regression, and analysis of covariance (ANCOVA)	word fluency and oral language weaknesses. • GRD participants were low across all reading skills • while isolated word fluency deficits are a sufficient cause of impaired context word fluency, it does not necessarily result in context word fluency proficiency • with all the variables entered simultaneously in the model, oral language was the only significant predictor
Dennis, 2012	**Research Purpose:** to determine the patterns of reading abilities of struggling adolescent readers **Theoretical Framework:** None provided **Definition of ORF:** rate/speed at which a person reads words regardless of accuracy	**Sample Characteristics:** n = 94 6-8th graders who failed state assessments in reading **Measures:** • ORF: TOWRE Sight Word Efficiency subtest; QRI-4 WCPM • RC (meaning construct): QRI-4; WJ-III Basic Reading Battery; Peabody Picture Vocabulary; Intermediate Spelling Inventory • Other skills measured: decoding **Statistical Approach:** Factor and hierarchical cluster analyses	• data showed a heterogeneous population of struggling readers • based on three factors (meaning, rate, and word knowledge), four salient clusters emerged from the cluster analysis • adolescents who struggle with reading are largely capable of multifaceted processes of reading • factor that least caused variance on failing performance on the state assessment was fluency
Denton et al., 2011	**Research Purpose:**	**Sample Characteristics:**	• moderate positive relations (r = .50–.51) between measures

	to examine (a) the relations among multiple measures of oral and silent reading fluency and RC for students in Grades 6, 7, and 8 and (b) the use of fluency measures to identify students at risk for failure on a high stakes RC test who may need supplemental reading intervention Research questions were also provided in the study. **Theoretical Framework:** None provided **Definition of ORF:** number of words read correctly per minute in a passage	*n* = 1421 6th-8th graders: 54% were classified as struggling readers and 46% as typical readers **Measures:** • ORF: TOWRE Sight Word Efficiency subtest, ORF Curriculum-Based Measurement (CBM) Passage Fluency; ORF CBM Word Fluency • RC: Texas Education Agency (TAKS) Reading Accountability Test; Passage Comprehension subtests from the GRADE; WJ-III • Other skills measured: silent reading fluency; verbal knowledge (vocabulary) **Statistical Approach:** correlation, z tests in differences in correlations, and linear regression, and Receiver Operating Characteristic (ROC) curve (Area Under the Curve-representing probability and classification accuracy)	of fluency and comprehension, which is generally weaker than often reported for younger students • ORF in context has higher correlations than ORF for words in isolation to comprehension
Eason et al., 2013	**Research purpose:** to further clarify the relationship between WRE and ORR by examining the overarching question of what (if anything) distinguishes WRE from ORR **Theoretical Framework:** SVR inferred by their reference of Hoover and Gough	**Sample Characteristics:** *n* = 88 children, ages 10 to 14 years, poor and average readers **Measures:** • ORF: GORT-4 Fluency (Rate and Accuracy subtests combined); SARA Battery • RC: Comprehension subtests from GMRT-4 and GORT-4; Reading	• participants with poor comprehension performed below average on measures of ORF, despite average word reading efficiency • while always providing variance, the amount changed for ORF and word reading efficiency depending on the

	Definition of ORF: (called Oral Reading Rate): fast, accurate reading of a story or paragraph aloud	Comprehension subtests from SDRT-4, DAB; WRMT Passage Comprehension subtest • Other skills measured: word reading efficiency; rapid naming; language **Statistical Approach:** hierarchical regressions and repeated measures analyses of variance (RM-ANOVAs)	RC measure • ORF contributes unique variance to RC beyond word reading efficiency, and that this unique variance, in part, can be explained by oral language abilities, specifically vocabulary/semantics
Gelbar et al., 2018	**Research Questions:** 1. Have secondary students with dyslexia achieved RC scores that are comparable with average peers? 2. How much variance in RC for secondary students with dyslexia is explained by cognitive ability, oral reaing fluency, and study strategies? 3. Which predictors are statistically significant predictors of RC in secondary students with dyslexia? **Theoretical Framework:** None provided **Definition of ORF:** words read correctly per minute	**Sample Characteristics:** *n* = 51 9-12th graders with dyslexia **Measures:** • ORF: WCPM with passages from high school textbooks • RC: Comprehension subtests from GMRT-4 • Other skills measured: cognitive ability and study strategies **Statistical Approach:** regression	• some secondary students with dyslexia can achieve RC scores that are comparable to their same age peers (57% of sample) • cognitive ability was the only statistically significant predictor of RC: 1.67 ($p < .001$) • ORF and study strategies were not significant predictors
Hock et al., 2009	**Research Purpose:** to examine the component reading skills of adolescent struggling readers attending urban high schools **Theoretical Framework:** Discourse Processing Theory **Definition of ORF:**	**Sample Characteristics:** *n* = 345 late 8th graders and early 9th graders (34 students with a specific learning disability) **Measures:** • ORF: TOWRE Sight Word Efficiency and Phonemic	• reading component skills of proficient readers vary; however, the same skills for ASRs have similar means • a fluency score alone may not indicate a comprehension issue

	pace, accuracy, and rate **Note**: The above definition was inferred by how the reading fluency construct was measured by three assessments.	Decoding Efficiency subtests; GORT-4 Rate and Accuracy subtests • RC: WLPB-R Passage Comprehension subtest, GORT-4 Passage comprehension subtest; Kansas State Assessment reading subtest • Other skills measured: listening comprehension; reading achievement; word level (decoding and word identification); vocabulary (receptive and expressive) **Statistical Approach:** principal components analysis (PCA)	• pattern of results comparing struggling readers (comp score <40th percentile) and proficient readers are similar whereas fluency is the lowest score and word level is the highest; however, the range of means is narrower for ASR than proficient readers
Kershaw & Schatschneider, 2012	**Research Purpose:** to investigate the added contribution of passage fluency, working memory, and IQ to a model of reading **Theoretical Framework:** SVR **Definition of ORF:** ability to accurately and efficiently read words in a list or a passage	**Sample Characteristics:** *n* = 3rd, 7th, and 10th grades (N = 215, 188, and 180, respectively) range of reader skill levels **Measures:** • ORF: AIMSweb grade level standardized ORF passages; WCPM on passages from textbooks and released Florida State Accountability Test passages • RC: Florida State Accountability Test reading assessment; Stanford Achievement Test (SAT-9) • Other skills measured: decoding; linguistic comprehension; verbal	in third grade, passage fluency (after controlling for decoding and linguistic comprehension) is highly correlated with RC (.83) and that this relationship decreases as children progress to grade 10 (.69)

		intelligence; working memory; performance intelligence **Statistical Approach:** structural equation modeling	
Lesaux & Kieffer, 2010	**Research Purpose:** explores the nature of reading comprehension difficulties among early adolescent language minority (LM) learners and native English speakers in urban schools **Theoretical Framework:** several frameworks were referenced (e.g., SVR, Discourse Processing Theory, and RAND Reading Theory) **Definition of ORF:** read words accurately and efficiently	**Sample Characteristics:** *n* = 262 6th graders (201 LM learners and 61 native English speakers) with a score at or below the 35th percentile on a standardized RC measure **Measures:** • ORF: DIBELS Oral Reading Fluency subtest, Woodcock Language Proficiency Battery-Revised Word Attack subtest, ad TOWRE • RC: GMRT-4 • Other skills measured: general vocabulary, decoding accuracy, working memory, and academic vocabulary knowledge **Statistical Approach:** latent class analysis	• two populations were evenly distributed among three skill profiles of struggling readers • despite relative differences in word reading accuracy and fluency, each profile was characterized by low vocabulary knowledge • majority of struggling readers were found to have developed basic fluency skills • models fitted with increasing numbers of latent classes indicated substantial heterogeneity within the population of struggling readers
Paige, 2011	**Research Purpose:** to investigate the relationship among extrinsic motivation for reading, oral reading fluency, comprehension, and academic achievement **Theoretical Framework:** automaticity theory, verbal efficiency theory, connectionist model of reading **Definition of ORF:** the ability to adequately read connected text, as	**Sample Characteristics:** *n* = 112 6th graders and 115 7th graders (range of reading skills) **Measures:** • ORF: combinations of TOWRE Sight Word Efficiency and Phonemic Decoding subtests with the GORT-4 Fluency subtest • RC: TORC-3	• all paths from extrinsic motivation to oral reading proficiency to comprehension to academic achievement for both independent samples of 6th and 7th graders are significant (t > 2.00), the majority of whom were struggling readers (below 40th

	represented by the indicators of speed, accuracy, and prosody, so as to foster the comprehension of text	• Other skills measured: reading motivation, academic achievement • **Statistical Approach:** structural equation modeling	percentile on oral reading fluency
Paige, Rasinski, & Magpuri-Lavell, 2012	**Research Purpose:** to explore the link between fluency and comprehension through an examination of the importance of prosodic reading in secondary students **Theoretical Framework:** None provided **Definition of ORF:** word recognition automaticity and prosody	**Sample Characteristics:** *n* = 108 9th graders attending a high school that has struggled with reading and academic achievement for more than a decade **Measures:** • ORF: Multi-Dimensional Fluency Scale (prosody); automaticity with narrative and expository grade level passages • RC: TORC-4 • Other skills measured: silent reading fluency **Statistical Approach:** correlation	• as students' average scores for oral prosody increased, comprehension improved • students with the highest prosody scores were the same students with the highest comprehension scores; reverse was true as well.
Paige, Rasinski Magpuri-Lavell, & Smith, 2014	**Research Questions:** 1. What are the relationships among the fluency indicators of accuracy, automaticity, and prosody with vocabulary and silent reading comprehension in secondary students? 2. To what extent do the indicators of accuracy, automaticity, and prosody form a reliable scale reflecting the construct of ORF in secondary students? 3. To what extent do vocabulary and the fluency indicators of accuracy, automaticity, and prosody contribute	**Sample Characteristics:** *n* = 108 9th grade students within a school that has 79% readers according to National Center for Education Statistics (2010) that are not reading with proficiency **Measures:** • ORF: GORT-4 Fluency (Rate and Accuracy subtests combined); Multi-Dimensional Fluency Scale (prosody); automaticity with narrative and expository grade level passages • RC: TORC-4	• average scores on all measures were representative of struggling readers. • all reading skill components correlated with the author's measure of silent reading comprehension • accuracy, prosody, and vocabulary explained from 50.1% to 52.7% of the variance in silent reading comprehension • word recognition automaticity did not

	unique variance to silent reading comprehension in secondary students? **Theoretical Framework:** SVR, Tandem Theory, and Construction-integration Model **Definition of ORF:** word recognition accuracy, word recognition automaticity, and prosody	• Other skills measured: silent reading comprehension; vocabulary **Statistical Approach:** bivariate correlation, principal component analysis (PCA), and hierarchical regression	contribute to silent reading comprehension although prosody was found to act as a partial mediator between automaticity and comprehension • accuracy, automaticity, and prosody were found to form a highly reliable scale reflecting ORF
Ritchey et al., 2015	**Research Purpose:** to investigate predicting reading status from fourth to sixth grades; to identify fourth grade measures that predict sixth grade reading problems **Theoretical Framework:** None provided **Definition of ORF:** ability to read connected text quickly and accurately	**Sample Characteristics:** n = 173 6th graders (range of reading skills, including SWD) **Measures:** • ORF: WCPM • RC: GMRT and CBM Maze • Other skills measured: oral language, phonological processing, decoding, spelling, word identification, word attack, teacher rating scales of behavior and reading skills **Statistical Approach:** exploratory principal axis factor analysis, logistic regression and receiver operator characteristic (ROC) curve analyses	• passage reading fluency was the only individually administered measure that added significant variance (6.97%) to the model • Together, Spelling Fluency, Teacher Rating of Reading Problems, and Passage Reading Fluency accounted for 44.38% of the variance (adjusted R^2 = .4339) • Two of the three variables were statistically significant (AUC = .91) to predicting identification as having reading difficulties (passage reading fluency and spelling fluency).
Savage, 2006	**Research Purpose:** To evaluate the simple view of reading model and to explore the reading performance of 15-year-olds with severe reading delays	**Sample Characteristics:** n = 56 adolescents (average age of 15) with a history of identified literacy-related difficulties	• decoding and linguistic comprehension described reading comprehension better than decoding and

	Theoretical Framework: SVR **Definition of ORF:** accurate and effortless reading of both individual words and connected text	**Measures:** • ORF: NARA-Revised for accuracy and rate • RC: NARA-Revised for comprehension • Other skills measured: spelling, decoding of nonsense words, listening comprehension, verbal ability, writing fluency • **Statistical Approach:** correlation, factor analysis, principal-components factor analysis, regression analyses	verbal cognitive ability as long as nonword reading was used to measure decoding. • if text-reading *accuracy* was used to index decoding, then verbal ability, not linguistic comprehension, provided the best fit. • reading *rate* did not correlate with verbal ability and listening comprehension • regression analyses showed that decoding and listening comprehension together at best explained around 66% of the variance in reading comprehension, suggesting there may be many other factors that might explain unique variance in reading comprehension in poor readers
Tighe & Schatschneider, 2014	**Research Purpose:** to investigate and rank order by importance the contributions of various cognitive predictors to RC in third, seventh, and tenth graders **Theoretical Framework:** SVR **Definition of ORF:**	**Sample Characteristics:** *n* = 215 3rd graders, 188 7th graders, and 182 10th graders (total n = 585), range of reader skill levels **Measures:** • ORF: AIMSweb grade level standardized ORF passages; WRCM on passages from	the fluency component was the most predictive of RC in third grade. By seventh grade, fluency and reasoning were both important predictors of RC. By tenth grade, among reading component skills

	the ability to accurately and efficiently read a passage aloud	textbook passages and released Florida State Accountability Test passages • RC: SAT-9 and the Sunshine State Standards Reading Comprehension subtest of the Florida Comprehensive Assessment Test (FCAT- SSS) • Other skills measured: decoding; listening comprehension; working memory; reasoning (verbal and non-verbal IQ) **Statistical Approach:** exploratory factor analysis and dominance analysis	assessed, reasoning was the only important predictor of RC
Tilstra et al., 2009	**Research Questions:** 1. What is the contribution of the SVR (decoding and listening comprehension) to RC outcomes for fourth-, seventh- and ninth-grade readers? 2. Does verbal proficiency contribute to reading comprehension beyond decoding and listening comprehension for readers at those three grade levels? 3. Does a measure of reading fluency (defined as text reading rate and accuracy) explain additional variance for the models when entered after decoding, listening comprehension and verbal proficiency for students at those three grade levels? **Theoretical Framework:** SVR	**Sample Characteristics:** *n* = 89 4th-, 89 7th-, and 93 9th-grade struggling, average, and good readers **Measures:** • ORF: CBM Oral Reading, WRCM from grade level passages • RC: GMRT Reading Comprehension test; CBM Maze • Other skills measured: verbal proficiency; listening comprehension; intelligence; decoding **Statistical Approach:** sequential multiple regression	adding verbal proficiency and reading fluency as additional predictors represented a 13% increase in total variance for fourth- and seventh-grade students and a 22% increase in explained variance in RC for ninth-grade students compared with the explanatory power of the original model containing only decoding and listening comprehension

	Definition of ORF: termed *reading fluency*, text reading rate and accuracy; also explained as the ability to group words into meaningful grammatical units and to read quickly, effortlessly and with expression		
Tolar et al., 2014	**Research Objectives:** 1. to provide evidence about the predictive validity of progress monitoring slope for gains in reading outcomes among older, more experienced readers. 2. to evaluate the effects of progress monitoring alignment, administration condition, initial versus final progress monitoring status, reading ability level, and level of reading intervention on progress monitoring slop predictive validity. **Theoretical Framework:** None provided **Definition of ORF:** Words read correctly per minute in connected text **Note**: The above definition was inferred by how ORF was measured.	**Sample Characteristics:** *n* = 1343 6th-8th graders: 588 typical, 284 struggling, not receiving intervention, 471 struggling, receiving intervention **Measures:** • ORF: Oral Reading Fluency CBM-Passage Fluency; TOWRE Sight Word Efficiency and Phonemic Decoding Efficiency subtests • RC: AIMSweb Maze CBM Reading Comprehension subtest; WJ III Passage Comprehension subtest • Other skills measured: word fluency **Statistical Approach:** multi-group structural equation models (SEM)	• significant linear growth ($p < .05$) in ORF-Passage Fluency (ORF-PF) for all groups and significant variance in linear growth among all familiar groups • no significant variance in growth among novel groups for ORF-PF ($p < .05$) • ORF-PF was generally not a significant predictor of reading achievement

Note. DAB: Diagnostic Achievement Battery; ELL: English Language Learners; GORT: Gray Oral Reading Test; GMRT: Gates McGinite Reading Test; GRADE: Group Reading Assessment and Diagnostic Evaluation; NARA: Neale Analysis of Reading Ability; ORF: oral reading fluency; QRI: Qualitative Reading Inventory; RC: reading comprehension; SAT: Stanford Achievement Test; SDRT: Stanford Diagnostic Reading Test; SVR: Simple View of Reading; SWD: students with disabilities; TORC: Test of Reading Comprehension; TOWRE: Test of Word Reading Efficiency; WIAT: Wechsler Individual Achievement Test; WJ: Woodcock Johnson; WLPB: Woodcock Language Proficiency Battery; WCPM: words read correctly per minute; WRMT: Woodcock Reading Mastery Test

Chapter 3

A Multiple Probe Study of a Word Level Intervention for Adolescents with Limited Reading Proficiency

More than three decades ago, our nation was sufficiently cautioned through *A Nation at Risk* (1983) that "individuals in our society who do not possess the levels of skill, literacy, and training essential to this new era will be effectively disenfranchised, not simply from the material rewards that accompany competent performance, but also from the chance to participate fully in our national life." This frightening report sparked new goals for early, developmental reading. Congress enacted Reading First in 2001 as part the ESEA reauthorization (i.e., No Child Left Behind) with the goal that all students will read on or above grade level by the end of third grade; however, nearly twenty years later, 65 percent of fourth and eighth graders continue to experience limitations in their independent reading of grade level text (NAEP, 2019). Specifically, high school readers performed lower in 2015 than their counterparts in 1992, when the National Assessment of Educational Progress (NAEP) reading assessment was first administered. Accordingly, by high school, readers who are not fully independent in reading course texts will likely experience waning motivation and confidence without appropriate assistance nor improvement in their circumstances. Thus, high school is our nation's last chance to redress any unmet literacy needs and a place for hope and perseverance.

Our response has been an increased emphasis on the use of screening, diagnostic, and progress monitoring tools and evidence-based literacy practices in classrooms, primarily in the early grades, and these efforts need to extend through grade 12 (Haynes, 2015). For instance, literacy improvement initiatives are influenced by the National Reading Panel's (NRP) recommendation (2000) that reading instruction include phonemic awareness, phonics (i.e., decoding), comprehension, fluency, and vocabulary. Fluency is defined as oral reading accuracy, rate, and prosody (NRP, 2000), yet practitioners and researchers typically assess fluency as words correct per minute, representing only the accuracy and rate components while excluding

prosody (e.g., Eason, Sabatini, Goldberg, Bruce, & Cutting, 2013; Gelbar, Bray, Kehle, Madaus, & Makel, 2018; Kershaw & Schatschneider, 2012; Tighe & Schatschneider, 2014). Simply put, prosody is ease or naturalness of reading (NAEP). Subsequently, the current implementation of fluency instruction and assessment in many schools and classrooms is built upon an incomplete conceptualization of the fluency construct (Kuhn, Schwanenflugel, & Meisinger, 2010). Further, fluency is an underrepresented component of the reading instruction in high schools (Raskinski, Rikli, & Johnston, 2009).

Adolescents with Limited Reading Proficiency

The current study focuses on adolescents with limited reading proficiency who are often referred to as adolescent struggling readers in the literature. Typical early readers progress through a general hierarchy of component skill development, whereas struggling readers may reach adolescence with gaps in several literacy areas (i.e., phonics, decoding, vocabulary, fluency, and comprehension) and have profiles of mixed strengths and weaknesses in different reading component skills (e.g., Brasseur-Hock, Hock, Kieffer, Biancarosa, & Deshler, 2011; Hock et al., 2009). Across studies, most of the struggling adolescent reading component scores were below average with individual differences in reading skills (e.g., ORF, decoding, vocabulary) likely leading to their lack of proficiency with reading comprehension (i.e., Brasseur-Hock et al., 2011; Cirino et al., 2013; Clemens, Simmons, Simmons, Wang, & Kwok, 2016; Cutting, Materek, Cole, Levine, & Mahone, 2009; Dennis, 2012; Tilstra, McMaster, Van den Broek, Kendeou, & Rapp, 2009). Two studies using similar methods of cluster and latent class analysis (Dennis, 2012; Brasseur-Hock et al., 2011) categorized non-proficient readers into four or five distinct profiles, respectively, suggesting heterogeneity in adolescent struggling readers' strengths and weaknesses (e.g., low accuracy, yet average rate). Brasseur-Hock et al. (2011) include a profile for readers who are low across all reading skill components when compared to normative scores for readers of all skill levels, finding adolescents with (a) significant skill weaknesses, (b) global skill weaknesses, (c) dysfluent readers, (d) knowledge weaknesses, and (e) reading strategy weaknesses. By this point in their reading experience,

adolescents have learned varied skills related to the reading process, some with success and some with challenges; therefore, the potential exists for there to be multifaceted strengths and weaknesses in their reader profile. Diagnosis of their reading needs and monitoring reading growth must be based on a comprehensive assessment protocol.

Since adolescents with limited reading proficient have distinct reader profiles, a movement away from the law of statistical averages for this population makes sense. In *The End of Average: How We Succeed in a World that Values Sameness* (2016), author Todd Rose, a leader of the Universal Design for Learning framework, describes an insightful study on verbal memory conducted by neuroscientist Michael Miller in 2002. Using an fMRI brain scanner while each of 16 participants completed a verbal memory task, Miller created a digital map of each brain, then averaged the maps together to report his findings on how the typical brain operates during such a task. However, when Miller systematically examined each brain, he realized that none of them looked like the "average" brain generated by his findings and none of them looked like each other. Rose (2016) explains, "Every discipline that studies human beings has long relied on the same core method of research: put a group of people into some experimental condition, determine their average response to the condition, then use this average to formulate a general conclusion about all people." Relying on a random effects model of the typical brain, the individual is assumed to be a variant of a normal brain, prompting researchers to remove outliers because they deviate too much from the average.

The Miller (2002) study builds caution into any hypothesis about what will occur for each unique adolescent reader while practicing the word level intervention in the current study. Averages help social scientists maintain a frame of reference to find meaning in statistics; however, we must use restraint that our interpretation of averages do not create limits on what we view as acceptable and expected for unique human beings. As an illustration from a study to develop a reading model, Francis, Kulesz, and Benoit (2018) explain, "if readers deploy their component skills in different ways, or are differentially impacted by the effects of text features, then simply changing the reader's standing on the component skills may not change

comprehension to the degree predicted by the between person regression coefficient that relates the component skill to comprehension in component skills research" (p. 285). The data collection and analytical methods to be employed in the current study examined evidence of intervention effectiveness on distinct reading component skills *and* with a synergistic, big picture understanding of the interaction of the reading component skills to yield pre- and post-test reading comprehension and strategy use for each adolescent reader.

Reading Theoretical Framework

As the theoretical framework for the current study, I integrate several reading theories with respect to the complexities of disciplinary literacy expected in high school (Shanahan & Shanahan, 2008) and the uniqueness of a reader's profile, especially by adolescence. As the overall guiding theory, the information processing theory (LaBerge & Samuels, 1974) posits that due to natural limits on cognitive resources (e.g., attention and short-term memory), readers must balance quick recognition of words (decoding) and constructing meaning (comprehension). Consequently, if a reader decodes too slowly, then his comprehension will be compromised (National Reading Panel, 2000). Proficient readers control this balance through their reading rate and do not do so in homogenous ways (Francis, Kulesz, & Benoit, 2018; Paige, Rasinski, & Magpuri-Lavell, 2012; Paige, Rasinski, Magpuri-Lavell, & Smith, 2014). As shown in Figure 1, the Simple View of Reading (SVR; Hoover & Gough, 1990), the Complete View of Reading (CVRi; Francis, Kulesz, and Benoit, 2018), and the Tandem Theory of Reading (Paige et al., 2014) comingle to illustrate that adolescents who develop efficient word and text reading skills use the newly freed up cognitive resources on the integration of prosody and linguistic comprehension (i.e., prior vocabulary knowledge, semantic understandings). Furthermore, reading component skills are influenced by characteristics present in varied text types and difficulty levels (i.e., multisyllabic, infrequently used or discipline specific words, integrative thinking skills). Next, I provide an elaboration for each reading theory and their interaction.

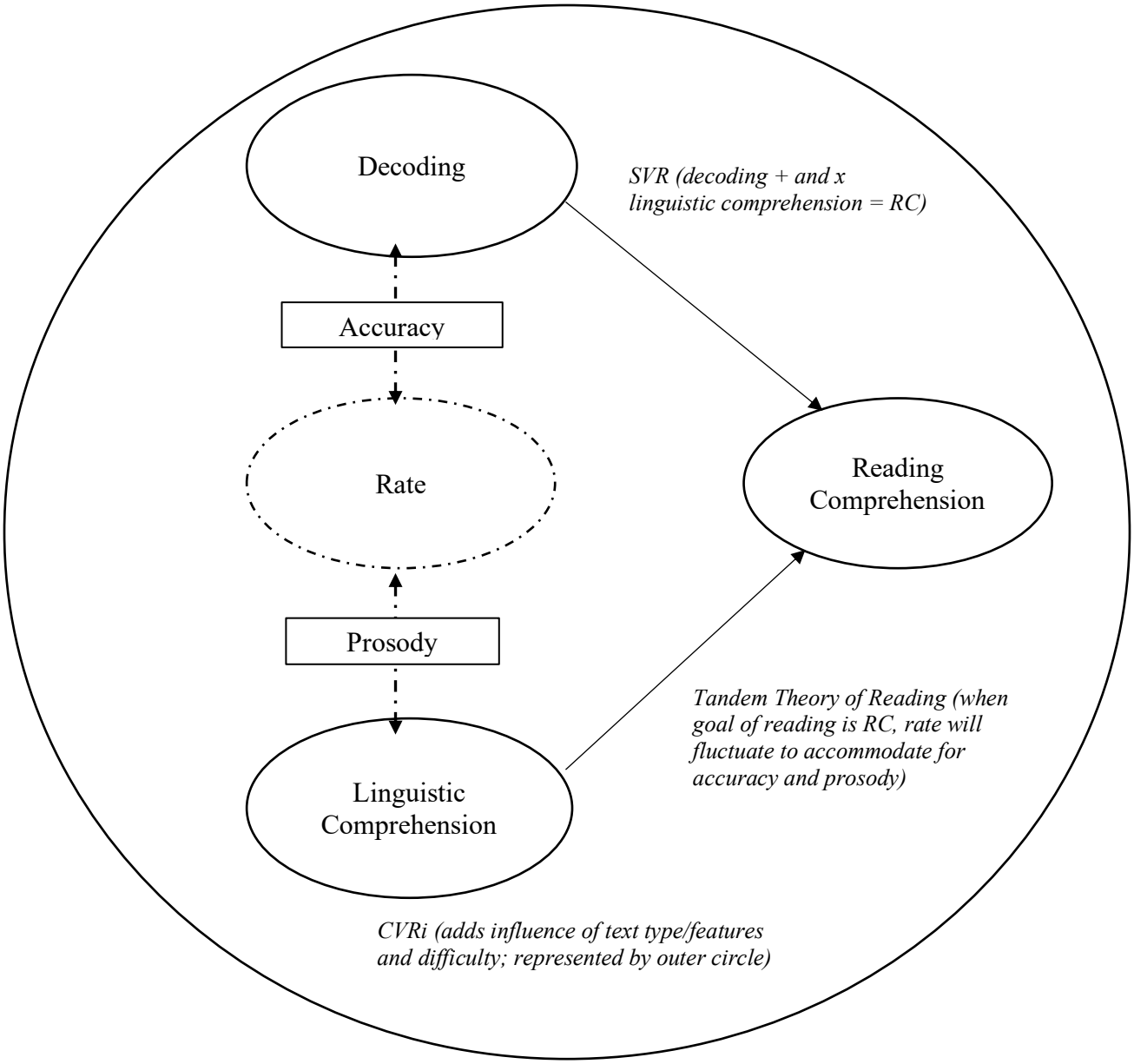


Figure 1. Concept map of guiding reading theories

Hoover and Gough's theory of reading (SVR) was delineated as a model in their 1990 article on the reading development of 1st through 4th graders. The study found that when early readers have partially developed reading skills, two overt components—decoding and linguistic comprehension—have an additive and multiplicative effect on reading comprehension (RC). Decoding and linguistic comprehension interact to result in RC. The SVR is a static model, describing reading at a single point in time and is not intended to describe *how* reading develops

over time (Hoover & Tunmer, 2018). Additionally, the SVR does not necessitate fast word reading and word meaning.

To extend the SVR, Francis, Kulesz, and Benoit (2018) conducted a study using a multivariate cross-classified random effects model. The intent of their research was to integrate several reading frameworks that focus on component skills and text discourse with the concept of personalization of the reading function. Their proposed model, the Complete View of Reading (CVRi), shows that readers develop differently and approach the reading task differently, showing a differential influence of text features on their fluency and reflecting heterogeneity at the person and passage level. While Francis et al. propose the CVRi as an extension of or alternative to the SVR, Hoover and Tunmer (2018) assert that a direct relationship between the two models requires additional research; nevertheless, both sets of authors express value in the CVRi for enabling individualization for instructional interventions that target personalized reading profiles.

Of import for the current study on adolescent readers, the CVRi takes into consideration the text features for the given reading task. Several studies found that relationships among reading component skills varied when variables for text type were itemized and when multiple measures for reading comprehension were used (Cutting & Scarborough, 2006; Cutting et al., 2009; Denton et al., 2011; Eason et al., 2013; Paige et al., 2014). For example, Eason's research team (2013) in their study to clarify the relationship between word reading efficiency and oral reading fluency (ORF) to reading comprehension included varied measures of RC. They found that the amount of variance changed for word reading efficiency and ORF depending on the RC measure used. These findings indicate a need for comprehension measures used at the secondary level to match the realistic demands of reading tasks.

Due to two intricacies in the reading models described thus far and the goal of the current study, a third reading theory is needed to create a comprehensive, guiding theoretical framework. The SVR does not explicitly include ORF and the study to develop the CVRi relied on ORF (measured as accuracy and rate only) as the outcome variable. ORF is comprised of more than

accuracy and rate. Several studies suggest that if ORF is measured solely by accuracy and rate to predict RC, then its predictive power is limited or confounded by extraneous variables (e.g., Cirino et al., 2013; Clemens et al., 2016; Cutting et al., 2009; Gelbar et al., 2018). Paige and colleagues (2012; 2014) examined the importance of prosodic reading to RC in secondary students. Prosody is the demonstration of both accurate and quick decoding and understanding based on influx and pausing at meaningful places for thinking in the text; in this case, complex text expected of older readers. These researchers claim that prosody is a missing component of the common definition of fluency because prosody simultaneously influences and reflects a reader's level of understanding while reading aloud or silently. In 2014, Paige and his colleagues proposed the Tandem Theory of Reading that assumes the purpose of reading is to comprehend, not just for reading aloud, such as to a child or for an assessment. When the goal of reading is to comprehend and sufficient meta-cognitive skills are in place, then accuracy and prosody maximize comprehension possibilities, whereas automaticity's benefit is solely the reader's choice to optimize his or her comprehension. This is supported by their finding that as students' average scores for oral prosody increased, so did their comprehension scores.

The Tandem Theory suggests that a skilled reader will read accurately with appropriate pace (not meaning fast) and with intonation appropriate for the text type and these two qualities taken together (i.e., automaticity and prosody) may serve as a proxy for proficient reading comprehension. The SVR influences the demonstrated skills named above because adequate decoding and linguistic comprehension make appropriate pace and intonation possible. The CVRi adds expected variability in skill due to text difficulty and the reader's familiarity with the subject matter.

Word Level Intervention Research

In a review of 22 randomized controlled trials (RCTs) on reading interventions for children and adolescents with reading disabilities, Galuschka, Ise, Krick, and Schulte-Korne (2014) evaluated varied treatments related to reading fluency, phonemic awareness, reading comprehension, phonics instruction, auditory training, medical treatments, and interventions

with colored overlays or lenses. The authors concluded that phonics instruction was the only approach whose efficacy on reading and spelling performance for this population is statistically confirmed. This meta-analysis demonstrated that severe reading and spelling difficulties could be treated with appropriate instructional methods. Associated with their conclusions is the recommended approach from the Center on Instruction for phonics instruction with older readers. To respect adolescents' background knowledge in phonemic awareness and phonics learned during their elementary years, instruction should focus on advanced word study and decoding multisyllabic words (Torgesen, 2007; Boardman, 2008).

A word level intervention designed in accordance with approximating guiding reading theories and with respect to the discipline-specific text at the high school level (i.e., expository text with a high frequency of multisyllabic words), is The Bridging Strategy (TBS), a strategy within the Fusion Reading program (FR; Deshler, Hock, & Brasseur-Hock, 2012). A premise behind TBS is that many adolescents with limited reading proficiency have adequate to strong linguistic comprehension, and the aim is to build their word decoding to balance them as readers. An assumption of the strategy's success is that the student will recognize the newly pronounced word and judge its meaning from prior knowledge or context clues and positively influence his or her reading comprehension. TBS consists of four core units: phonics, decoding, word identification, and reading fluency. When students apply TBS, they use multiple skills and strategies to quickly and accurately recognize words in connected text. When students encounter an unfamiliar multisyllabic word, they learn to apply a four-step strategy in which they break unrecognized multiple syllabic words into pronounceable word parts. These word skills are taught to a level of automaticity.

Fusion Reading is an evidenced-based reading program published by McGraw-Hill Education. The program is a supplemental reading course and is usually taught as an elective. The curriculum includes seven units, each taught using explicit instruction. Bundled into the program are four major components: (a) Engagement and Motivation, (b) Word Level Instruction, (c) Comprehension, and (d) Ongoing Assessment. Studies support the effectiveness

of FR, and two examples follow. An underpowered random assignment examination of 9th and 10th graders with limited reading proficiency in an urban high school showed a moderate to large effect size (.70 Hedges' d) for reading comprehension on the GRADE (Hock, Brasseur-Hock, & Deshler, 2016). A quasi-experimental matched comparison group of middle school students with limited reading proficiency in a suburban area, showed an effect size range of 1.04 to 1.66 (Hedges' d) on the total scores on the GRADE (Hock, Brasseur-Hock, & Duval, 2017).

Theory of Change

A theory of change refers to a conceptual framework that describes why an intervention should result in changes in a given target behavior. Assessment with proximal connection to the intervention is more informative of the effectiveness of the intervention than more distal standardized measure of comprehension (Catts, 2018). Given the intent of the word level intervention under study that readers with improved word attack skills will improve their reading comprehension, growth is expected in multiple reading component skills on the pathway to proficient reading. The reading component skills of word identification (proximal measure) and oral reading accuracy, rate, and prosody (distal measures) are expected to be sensitive to incremental change within the intervention timeframe. Other reading skills (overall strategy use, silent reading fluency, and comprehension) are expected to change after a period of learning has occurred.

The inclusion of multiple reading component skills in the current study supports an examination of which skills change for which students and when does the change occur. Standardized measures of oral reading fluency focus on rate and accuracy, undervaluing the import of reading with expression, which has been shown as an integral component of fluent reading (Benjamin et al., 2013). In fact, Rasinski and colleagues (2009; Paige et al., 2012 & 2014) have found that reading prosody rates have a significant relationship to silent reading comprehension scores; thus, growth in prosody levels should yield improved reading comprehension at post-test in the current study. Furthermore, in a study by Tolar, Barth,

Fletcher, Francis, and Vaughn (2014), examining the predictability of varied progress monitoring slopes to different outcome measures (e.g., fluency, comprehension), found that slope validity was greatest when progress monitoring measures were aligned with the outcome. More specifically, their results showed that ORF (measured as accuracy and rate only) was generally not a significant predictor of RC. The current study's inclusion of prosody, in addition to accuracy and rate, may confirm their findings.

Again, the degree of change for each individual and the impact of this growth on reading comprehension differs. According to the CVRi, variables show variability when comparing students to each other and to themselves, due to text features and difficulty level as well as individual attributes (such as background knowledge on the subject matter and processing speed, which are assumed to have natural variability across individuals). In a study by Groen, Veenendaal, & Verhoeven (2018), researchers found that 5th graders with below average reading comprehension have low reading prosody scores and that the relationship between reading prosody and reading comprehension does not rely entirely on decoding. The Groen et al. study generates curiosity and caution about potential results of the current study, particularly in consideration that the influence varies based on the uniqueness of the individual reader.

Purpose of Research and Questions

Comprehensive reading interventions aimed at building strategic readers are effective for adolescents (Scammacca, et al., 2016; Slavin et al., 2008; Swanson et al., 2014). However, empirical evidence for many literacy practices relies on an interpretation of averages, and it is up to practitioners to fit their use within their context and for their unique students (Leko, 2015; Leko, Roberts, & Pek, 2015). Additionally, evidence from group experimental design shows that reading interventions change the average growth of *groups* of participating students; yet, the effectiveness of reading interventions on multiple reading component skills for *each* participant can be explored further. We need to understand how evidence-based reading interventions taught by teachers affect individual readers, meaning which skills in their reader profile change as they are learning and after they have learned a reading strategy. A multiple

probe analysis informs researchers and practitioners about which aspects or the collective whole of an intervention cause change for individuals who tend to be so variable in their profile as to violate assumptions of averages.

More specifically, current evidence shows that the comprehensive package of interventions within the Fusion Reading program have a positive influence on reading comprehension for adolescents, and the research base for each component is immense. However, empirical evidence has not been gathered for each explicit reading intervention within FR. Given studies that show 80% of adolescents with limited reading proficiency lack word level skills in addition to having heterogenous reading component skills (Hock et al., 2009; Brasseur-Hock et al., 2011), a word level intervention (i.e., TBS) is a logical candidate for evaluation. The current study could be considered a conceptual replication (NSF & IES, 2018) in that a specific component of the comprehensive package were examined using different analytical approaches than any of the previous studies of FR. Furthermore, past studies of FR measured reading comprehension as the outcome variable and not FR's effect on multiple reading component skills. Another factor is many studies that measure ORF do not include prosody.

The purpose of this research was to examine the effectiveness of a word level intervention on multiple reading component skills of adolescents with limited reading proficiency to answer the following questions divided into primary and secondary analytical approaches. The primary analysis was based on a multiple probe single case design, and the secondary analysis tested for differences using non-parametric statistics.

- Primary Analysis: Do the word level skills (i.e., word identification, oral reading accuracy, rate, and prosody) of adolescent readers with limited reading proficiency improve when they are taught the Bridging Strategy intervention?
- Secondary Analysis: Which factors (i.e., strategy use, silent reading fluency, or sentence comprehension) improve for adolescent readers with limited reading proficiency after learning the Bridging Strategy intervention?

Method

Research Design

The design for this study was a single case design (SCD; Horner et al., 2005; Kratochwill & Levin, 2010; Shadish, Hedges, Horner, & Odom, 2015). The specific variation of the SCD was a *multiple probe across participants and settings* design with observation of outcomes at theoretically specified points during the intervention phase (Ledford & Gast, 2018). The design was replicated for clusters of students (i.e., case) in two classes taught by different teachers in different schools. Each student within a class was considered individually and as a case. The independent variable (i.e., intervention) under study was The Bridging Strategy (TBS), the second of several reading strategies taught to students as part of the Fusion Reading Program (Deshler et al., 2012), for which I am a certified professional developer.

Settings and Teachers

This study took place in two classrooms (referred to as Fusion Classes A and B). To increase internal validity for this study, participating teachers implemented TBS for a minimum of 30 minutes daily, decreasing history effect (outside factors influencing the results) and maturation effects (intervention taking place in the briefest duration). By the time of the study, students were familiar with the classroom setting, routines, and procedures as students participated in units of instruction prior to beginning the unit under study. Fusion Class A was a stand-alone elective course; Fusion Class B was part of a foundational English 9 course. Both teachers consistently used the published instructor's manuals, student materials, and associated visual supports during implementation.

Teachers were a special education teacher and an English teacher, and each taught one Fusion Reading class of 4-5 students. The teacher for Fusion Class A had 26 years of teaching experience, had taught Fusion Reading two times previously with extensive professional development and coaching from certified Fusion Reading professional developers, held a bachelor's degree in social studies education and political science and a master's degree in special education, and had co-taught a wide range of courses, including math, social studies, and English. The teacher for Fusion Class B had six years of teaching experience, had taught Fusion

Reading one previous time with access to professional learning support through online modules and a professional learning community, held a bachelor's degree in English and a National Writing certification, and had taught foundational, general, and honors English courses.

Intervention

The Bridging Strategy (TBS) consists of four core elements: phonics, decoding, word identification, and reading fluency. When students applied TBS, they used multiple skills and strategies to help them quickly and accurately recognize words in connected text as represented by the PART and FIND Steps shown in Figure 2. For example, when students encountered an unfamiliar multisyllabic word, they first Pronounced letter sound(s) within the word. The student attempted to say each combination of letters and blended them into a word that was in their listening vocabulary. If that didn't work, they Analyzed the beginning and ending letters of the word. Again, the student said each word part and blended them together. If the word was still unrecognizable, the student proceeded to the next step of the strategy, Review the remaining letters to find and pronounce the syllable(s). Here, students were taught to find high-utility syllable patterns and to say each part of the word, blending the parts. If the student recognized the word, then they re-read the word in context to check for meaning. If the student still did not recognize the word, then they used the last step, the "Try another Resource" step. With this step, students asked another person, used a dictionary, or used the computer to figure out how to say the word and what the word meant. Teachers provided positive and corrective feedback to small

cooperative groups and, as needed, to individual students. In short, PART and FIND became memory devices for students learning the process.

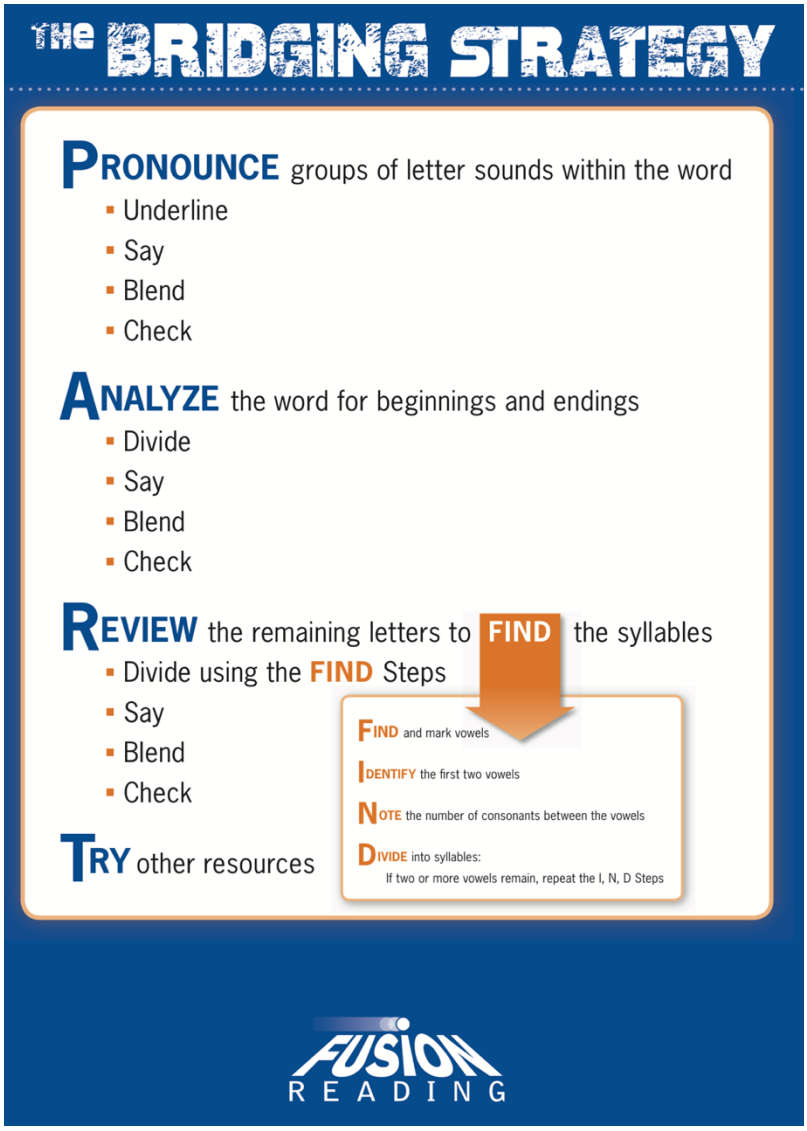


Figure 2. The Bridging Strategy PART and FIND Steps

After mastering the individual steps of the strategy, students applied them while reading progressively challenging expository and narrative texts through fluency reads. The fluency reads in TBS are not like typical 1-minute reads. Students read the same 200-400 word passage aloud to a partner three times with a different focus for each reading. Throughout the process, partners act as coaches and give feedback. First, students read their assigned passage silently to identify words they do not know how to pronounce. They used the PART & FIND steps to

analyze how to pronounce the self-identified words and read the words twice aloud to their partner. Next, students read their passages to their partners for *accuracy*. While reading aloud, the partner marks miscues on the passage and times the read. Between reads, students discuss words read incorrectly and re-analyze pronunciation for accuracy. Students proceed to read aloud two more times, once for *speed* and once for *comprehension*, while the partner continues to mark words and time. Lastly, students take a short comprehension quiz on the passage content. Students plot their scores on a progress chart. At this point, students reverse roles. The teacher monitors students while they work, providing assistance if needed.

Materials

The Fusion Reading intervention package included teacher and student materials for each reading strategy. Teachers were provided with assessment materials to support the dependent measures in the study. Assessment materials included specific passages to use for the reading probes, multisyllabic words from the 9th grade passages, and an assessment form for students to identify and analyze unknown words. Prosody measured from complex passages is more predictive of overall reading skills as compared to less complex passages (Kuhn et al., 2010). Therefore, reading probes used the 9th grade level expository passages in the Fusion Reading student workout books. Metametrics were calculated to determine a Lexile ranging from 1050L to 1240L for the 9th grade Fusion Reading passages, and many passages were excerpts from authentic, academic texts. Two factors known to cause variability in reading outcome measures are text difficulty and text type (Francis et al., 2018); for this reason, selected passages were similar in terms of Lexile level, length of sentences, frequency of words in the English corpus, and text type (i.e., expository). Schools provided a computer for students to audio record their word pronunciation and passage reading.

Student Participants

A total of 6 students from two different Fusion classes (i.e., two from Fusion Class A and four from Fusion Class B) participated in this study.

Inclusion Criteria. One method to approximate random assignment and avoid selection bias is to use the school's placement criteria for students receiving reading interventions. Students showed the need to participate in Fusion Reading primarily based on their Virginia Grade 8 Reading Standards of Learning scores (VA Read 8 SOL scores). The school for Fusion Class A also considered the results from the Test of Silent Contextual Reading Fluency (TOSCRF). Eligible students may or may not have had IEPs with reading goals; however, none of the students had active IEPs. One student had a 504 for attention-deficit hyperactivity disorder; another student was learning English as a second language; and another student formerly received special education services for a speech-language impairment in elementary school. Students were male and female, in the 9th grade, and race, ethnicity, and socioeconomic status was not considered. Participating student demographics are presented in Table 1.

Table 1.

Student Demographics

Class	Pseudonyms	Grade	Age	Gender	VA Read 8 SOL Score (Proficient = 400)
Fusion A	Jack	9	14	Male	373
	Shane	9	15	Male	324
Fusion B	Brady	9	14	Male	338
	Emily	9	14	Female	338 (417 retake)
	George	9	14	Male	338
	Nube	9	15	Female	n/a

Measures

Primary dependent measures. During baseline and intervention phases, students were repeatedly assessed on the reading component skills of word identification (proximal measure) and oral reading accuracy, rate, and prosody (distal measures). These reading skills are expected to be sensitive to incremental change within the intervention timeframe.

Word identification. In this study, students decoded multisyllabic words drawn from grade level passages to show word identification skills. During baseline and intervention phases, when students were asked to read a particular passage, he or she first read a minimum of five multisyllabic words from the passage that he or she was about to read. The student may have applied the intervention four-step strategy to these words as well as to any other words in the passage that he or she deemed unknown prior to reading the passage aloud. Word identification is foundational to oral reading automaticity and prosodic reading (Benjamin et al., 2013; Kuhn et al., 2010).

Oral reading accuracy, rate, and prosody. Oral reading fluency (ORF) is the simultaneous execution of accuracy, rate, and prosody (Berninger, Abbott, Billingsley, & Nagy, 2001; Paige et al., 2012; Paige et al., 2014; and Tilstra et al., 2009). ORF has traditionally been defined as a reader's ability to quickly and accurately decode words and is typically measured during passage reading (Hasbrouck & Tindall, 2005). To obtain a comprehensive evaluation of each student's oral reading fluency, I measured words read correctly per minute (WCPM) and level of prosodic reading. Visual mapping of the individual scores also allowed an analysis of the reading component skills separately.

To measure the accuracy and rate (together known as automaticity; Kuhn et al., 2010) components of oral reading fluency, I assessed the number of words read correctly for the first minute (WCPM) from grade level passages. Norms for grade level expectations of WCPM are not established for 9th grade; however, TBS instructor's manual states that fluency mastery is 125-150 WCPM (Deshler et al., 2012), and Raskinski et al. (2017) propose that 147 WCPM while reading for comprehension is at the 50th percentile for college-ready students. It is important to note that reading rate may be slower when reading for understanding as compared to reading for speed (i.e., current normed rates through 8th grade). For accuracy expectations, 95 percent is considered reading at an instructional level, whereas 99 percent indicates independent reading level (Johnson, Kress, & Pikulski, 1987 as cited in Rasinski et al., 2017).

Prosody, defined as ease or naturalness of reading (NAEP), is an important component of oral reading fluency. Prosodic reading shows expressive interpretation of large meaningful phrases and adheres to the author's syntax. To measure prosody, the Multi-Dimensional Fluency Scale, adapted from Zutell & Raskinski (1991), was used. This rating scale, grounded in spectrographic features of prosodic reading, is organized into four categories: expression and volume, phrasing, smoothness, and pace. Scores range from 4-16, and students scoring 8 or below are considered in need of intervention.

Authors of prosody measures report very limited reliability data. Given the subjective judgement involved in using the prosody scale, evidence of reliability is provided through interrater consistency and within examinee consistency over repeated measurements (NCME, 1999). Raskinski, Rikli, and Johnston (2009) claimed a consensus estimate of 81% for two raters, reliability of 94% for exact or adjacent matches, and 86% agreement within 2 points on the Multidimensional Fluency Scale. Fortunately, researchers have found high levels of inter-observation agreement after brief training on the prosody scales (Kuhn, 2005; McKenna & Stahl, 2003).

Secondary dependent measures. Before phrases began and after they ended, additional data on variables that show meaningful change pre- and post-intervention were gathered. Strategy-use is a proximal outcome variable that shows an influence of TBS on student skills. Sentence comprehension and silent reading fluency (distal outcome variables) are *not* expected to be sensitive to incremental change within the intervention timeframe; however, they have a socially meaningful influence on students' ability to read desired text in their personal life and while completing coursework.

The Bridging Strategy Pre-/Post-Tests. During the first and last lesson of the Bridging Strategy, students took an assessment to determine how they use phonics to break apart multisyllabic words. The pre-/post-test has 13 items, worth a total of 60 points.

Sentence Comprehension Subtest of the Group Reading and Diagnostic Evaluation (GRADE). The GRADE has subtests for Passage and Sentence Comprehension and Vocabulary.

The GRADE has high internal consistency reliability estimates (.89 to .99). Alternative form reliability (N = 696) ranged from .81 to .94. Construct validity was evaluated by correlating scores among subtests of the Iowa Test of Basic Skills and GRADE for a sample of seventh- and eighth-grade students. The Sentence Comprehension subtest has two forms (A and B) with 19 items each and takes approximately 10 minutes to administer. Students are given a sentence with a word missing and must select the best word from four to make the sentence make sense. (Williams, 2001)

Test of Silent Contextual Reading Fluency (TOSCRF-2). The TOSCRF is a nationally normed test assessing silent reading ability. The test measures a student's ability to recognize the individual words in a series of printed passages (no spaces between words) that become progressively more difficult in context, vocabulary, and grammar. Students have 3 minutes to get as far as they can in the multiple passages. The TOSCRF also measures fluency. Its test-retest reliability ranges from .93 to .97. Correlations of the TOSCRF with other comparable assessments (WJ-III; .69), (GORT-4; .67), and (Stanford 9; .68) are strong (Hammill, Wiederholt, & Allen, 2006)**.**

Social validity measures. Social validity exists if the magnitude of change in the dependent variable resulting from the intervention is socially important (Ledford & Gast, 2018). After the final assessments were given, teachers and students completed a brief survey regarding his or her believe about how TBS may make a difference in their future. For the open-ended questions, their responses were coded and then similar codes were clustered into categories (Glaser & Strauss, 1967; Miles & Huberman, 1994).

Procedure and Procedural Integrity

This study was reviewed and approved by the Virginia Tech IRB human-subjects board. Once approved by IRB, I emailed school division staff to inquire about their interest in participating in the study and to gain permission to contact their FR teacher. Informed consent was obtained from each teacher and all parents of participating students. Additionally, students were asked for verbal assent to participate in the study. Once all permissions were obtained,

participating students selected a pseudonym to maintain anonymity during data collection. Probes were conducted on paper and on school-provided computers using the internet. The audio recordings were made using a free online voice recorder (https://online-voice-recorder.com/) and submitted using a Jot Form (https://www.jotform.com/) with their pseudonym. Assessment procedures were conducted within the same classroom setting where the intervention was implemented or a quiet, familiar space nearby. Teachers learned about their responsibilities within the research design through written explanations, phone calls, and on-site visits. To maintain procedural integrity while conducting the study, I maintained a fidelity checklist that explicated each step for implementing the research design (a completed checklist can be found in the appendix).

Baseline phase. In the first phase, the baseline conditions of the target skills (oral reading accuracy, rate, and prosody as well as word identification) were confirmed daily for six instructional days in Fusion Class A and five instructional days in Fusion Class B. Given prior teacher experience with students in the FR intervention and documented student reading achievement history, it was anticipated that stable baselines would easily be established. During the baseline phase, I visited each classroom once to assist with the first probe as well as collect evidence that control variables (classroom routines and procedures) were present in the same manner as the intervention phase as well as evidence that the intervention was not being implemented yet.

Intervention phase. After baseline was established, students learned the four-step strategy to pronounce multisyllabic words. After mastering each of the four steps, participating students completed a probe set of the targeted skills at grade level. Once students showed mastery of all four steps in the strategy, students practiced using these steps with passages at their current reading skill level. When they met mastery expectations, according to the instructor's manual (125-150 WCPM and 80% on an accompanying comprehension quiz), they completed another probe set. Next, students practiced the strategy with a passage above their level, and after meeting mastery requirements, took a final probe set. At least five probes

occurred during this phase. Based on demonstrations of effect or non-effect during the intervention phase, the intervention was systematically manipulated (Horner et al., 2005). Specifically, the teacher provided feedback to each student on his or her use of the four-step strategy and asked for additional practices prior to the next probe set to improve student skill mastery. Accordingly, the independent variable and the dependent variables were monitored closely for formative evaluation. The length of the intervention phase was approximately fifty-five instructional days in both classes.

Measurement procedures. Prior to the start of the baseline phase, students completed three assessments: TOSCRF, TBS Pre-test, and the GRADE Sentence Comprehension subtest. Around this time, students learned about how to use the online audio-recorder and became familiar with the technology before the phases began, avoiding the Hawthorne effect (i.e., adaptation threat to internal validity). At specified times during baseline and intervention phases, teachers prompted students to read into an audio-recorder on the computer a minimum of five multisyllabic words, an approximately 200-word 9th grade level passage, and their answer to one comprehension question. As part of the assessment procedure, students were informed and reminded of the purpose for reading: to comprehend (rather than for speed). The intent of the comprehension question was to reinforce that their purpose for reading was to understand; however, their answer to the question was not assessed. Prior to reading aloud into the recorder, students were able to identify other unknown words from the passage and to apply the four-step strategy, as they were able, given the point in strategy instruction. An example reading check passage is provided in Figure 3. Jot Form automatically notified me when a student had uploaded a new audio-recording. At that point, I scored student products and translated results into percent correct to allow for side-by-side interpretation and comparison. After the intervention phase was

complete, students completed the TOSCRF, TBS Post-test, and the GRADE Sentence Comprehension subtest.

Reading Check

Instructions:

1. Silently read the passage for unknown words.
2. Copy unknown words to the Scrimmage Word Form. Five words are already provided.
3. Apply the PART Steps to each word (the words provided and any new words you have identified). Circle each step you use.
4. Read the provided five words into the audio recorder.

	Unknown Words	Circle the PART used	Points
1	emit	P A R T	
2	oxides	P A R T	
3	sulfuric	P A R T	
4	acidity	P A R T	
5	stability	P A R T	
6		P A R T	
7		P A R T	
8		P A R T	
9		P A R T	
10		P A R T	

Acid Rain

When fossil fuels such as coal, gasoline, and fuel oils are burned, they emit oxides of sulfur, carbon, and nitrogen into the air. These oxides combine with moisture in the air to form sulfuric acid, carbonic acid, and nitric acid. When it rains or snows, these acids fall on Earth in what is called acid rain.

During the twentieth century, the acidity of the air and acid rain have come to be recognized as leading threats to the stability and quality of Earth's environment. Most of this acidity is produced in the industrialized nations of the Northern Hemisphere—the United States, Canada, Japan, and many countries of Europe. The effects of acid rain can be devastating to many forms of life, including human life. Its effects can be most vividly seen, however, in lakes, rivers, and streams. Acidity in water kills virtually all life forms. By the early 1990s, tens of thousands of lakes had been destroyed by acid rain. The problem has been most severe in Norway, Sweden, and Canada.

Scientists use what is called the *pH factor* to measure the acidity or alkalinity of liquid solutions. On a scale from 0 to 14, the number 0 represents the highest level of acid. Fourteen represents the most basic or alkaline.

Question:
Why is acid rain bad?

1190 Lexile

Figure 3. Example Reading Check Passage (An Excerpt from the Jamestown Timed Readings Series; Spargo, 1998)

Reliability of Scoring

To establish interobserver agreement for the dependent variables, another scorer with reading experience scored 20% of student products during baseline and intervention phases.

Prior to the IOA training, the second scorer read the article by Kuhn et al. (2010) that explicitly defines each aspect of automatic and prosodic reading, the WCMP instructions, and the prosody rubric. During the IOA training, definitions, measures, and data collection procedures were discussed in depth. Prior to beginning the study, scorers practiced scoring procedures with sample products until an acceptable criterion level for training of 90% agreement was reached (Ledford & Gast, 2018). Once the study began, after the first of each type of product was scored, each scorer followed the scoring procedures independently and compared results. If disagreement existed, the product was re-scored collaboratively until agreement was met and additional, necessary ground rules were documented for future scoring procedures. To address an instrumentation threat to internal validity, the level of IOA needed to be 80% or higher agreement. IOA was calculated by dividing the agreements by the total (agreements plus disagreements) and multiplying by 100. For the primary dependent measures, IOA for word identification was 93%; IOA for WCPM and accuracy was 97%; and IOA for prosody was 83% with exact or adjacent matches (100% when within 2 points was considered). For the secondary dependent measures, IOA for the GRADE Sentence Comprehension subtest was 99% (1 disagreement); IOA for the TOSCRF was 100%; and IOA for TBS Strategy-Use Tests was 100%.

Intervention Fidelity

The Fusion Reading program includes a fidelity of implementation checklist for TBS. TBS fidelity checklist measures the explicitness of teacher instruction (e.g., explain, model, practice, feedback, assessment) and alignment of teacher behaviors with procedures outlined in the instructor's manual for each lesson. I visited each Fusion Reading class two times during the intervention phase to observe TBS instruction. During the class visits, I used TBS fidelity checklist and my knowledge of core instructional components of TBS as a Fusion Reading professional developer to determine a rating of fidelity. I video-recorded one time per teacher (i.e., half of the visits), and an author of the Fusion Reading program used the TBS fidelity checklists for these lessons. The teachers also completed the TBS fidelity checklist as self-

assessments for the two observed lessons and two other lessons. Checklists completed by the author, the researcher (myself), and teachers were compared. For the first observed lesson, IOA between author and researcher was 92% for Fusion Class A and 95% for Fusion Class B. IOA between researcher and teacher was 72% for Fusion Class A and 95% for Fusion Class B. During this lesson, the teacher for Fusion Class A unintentionally omitted a component. After debriefing, he realized the oversight and re-taught that portion of the lesson the following day. For the second observed lesson, IOA between the researcher and teacher was 100% for Fusion Class A and 100% for Fusion Class B, and all components of the lesson were present and correct. For self-assessed lessons without researcher observation, teachers submitted the TBS fidelity checklist via email, and then we debriefed about how instruction and students were progressing. The teachers' self-assessments of the observed lesson were compared with the fidelity checklists completed by the researcher and author in order to add to the validity of their self-assessments for unobserved lessons; however, in one case, reliability was below 80% causing some concern for the accuracy of future self-assessments.

Data Analysis

Triangulation of data is critical for interpreting the results of single case design studies; therefore, the following data analyses include visual analysis and non-parametric testing of proximal and distal measures, and effect size calculation for each. An assumption of single case design is that changes taking place after the start of intervention can be interpreted as the effect of intervention directly. Therefore, each student served as their own control factor, following a foundational principle of SCD known as baseline logic (Sidman, 1960 as cited in Ledford & Gast, 2018). A sample size of 3 is typically adequate to establish experimental control and make valid inferences about treatment effects (Kazdin, 2011). In single case design, replication of the cases within conditions adds to the external validity of the findings (Levin, Lall, & Kratochwill, 2011). Two types of replication were used in this design. Direct replication was accomplished by enrolling multiple students (n = 6) based on the functional inclusion criteria (Ledford & Gast, 2018). This provides insights into whether different students with similar reading levels would

respond to the treatment. Systematic replication was accomplished by studying the effectiveness of this intervention under similar, yet different conditions and using different variables than previous FR studies. To improve systematic and objective evaluation, I discerned patterns for each participant by conducting a visual analysis per phase based on a consideration of level, trend, and variability (Kratochwill et al., 2010 as cited in Ledford & Gast, 2018). This analysis was critical for determining phase change, systematic adjustments to the independent variable, and answering research questions. Even though multiple dependent variables were monitored, the word identification score (a proximal data point) took priority in making design decisions. Once the intervention phase was complete, additional visual analysis considered a) immediacy of the effects, b) overlap, and c) consistency of data patterns.

Secondary data analyses were conducted using the results of three assessments for strategy use, silent reading fluency, and sentence comprehension. Due to anticipated non-parametric distribution caused by the small sample size and the nature of the population, I used the Wilcoxon signed rank test, which is the non-parametric alternative test to the paired-samples t-test for related observations (Wilcoxon, 1945). This test is the most appropriate test for the given data and assumptions made about the population in that it does not make any assumptions about normality given that the analyses is conducted on ranked scores (Moore & McCabe, 2005). There are three assumptions met for this test: 1) the paired differences are independent, 2) the measurement scale is an ordered metric scale and allows for the paired differences to be ranked, and 3) there are at least five pairs of observations.

The Wilcoxon signed rank test compares two medians of groups on each variable rather than the mean of groups. Three reasons to use a non-parametric test are: 1) the median is more meaningful than the mean, 2) the sample size is too small for a parametric test, and 3) outliers can not be removed. When a distribution is skewed too much, the mean is strongly affected by outliers in the distribution's tail; however, the median continues to more closely reflect the center of the distribution. For example, if one or two students experienced extreme growth or very little growth, then the mean would not inform the actual influence of the intervention on the group's

skills; whereas the median of the group is more representative and insightful in understanding change within a heterogenous group. In sum, non-parametric tests check hypotheses about the median instead of the mean (see Figure 3 for hypothesis and null hypothesis)**.**

H_A	The median of the difference between pre-test and post-test scores will be higher for strategy use, silent reading fluency, and sentence comprehension.
H_O	There is no difference or there is a reduction in the median between pre-test and post-test scores for strategy use, silent reading fluency, nor sentence comprehension.

Figure 4. Hypothesis and null hypothesis for secondary analysis

Lastly, even though the underlying assumptions of averages used in group research are in conflict with the theory behind SCD focused on individuals, an additional factor for magnitude, the Tau-U effect size, was calculated to increase respectability of findings in comparison with the results of other research designs (Shadish, 2014). In the case that meaningful trends exist in the data, Tau-U is used to quantify the non-overlap between phases. Tau-U has several advantages that make it useful for this analysis: (a) It is more powerful than parametric techniques for most single subject data that do not conform to parametric assumptions, (b) It follows the "S" sampling distribution so p-values and confidence intervals are available, (c) It can control for baseline trends when present, (d) It has virtually the same power as linear regression techniques when data meets parametric assumptions, and (e) data for several phase contrasts can be analyzed independently and then combined to examine an overall or omnibus effect size (Parker & Vannest, 2014; Parker, Vannest, Davis, & Sauber, 2011; Vannest, Parker, Gonen, & Adiguzel, 2016). Calculations for Tau-U were performed using the web-based calculator available on www.singlecaseresearch.org, described in an article by Parker, Vannest, & Davis (2014), and was defined as

$$\text{Tau-U} = \frac{S_P - S_A}{mn} = \text{Tau} - \frac{m-1}{2n} t_A.$$

To note, the net effect of controlling for baseline trend causes smaller impacts on results than are usually found with regression analysis. Tau-U can be interpreted in terms of size of effect (i.e., small effect: 0–0.62; moderate effect: 0.63–0.92; strong effect: 0.93–1.00; Parker, Vannest, & Davis, 2011; Parker, Vannest, Davis, & Sauber, 2011).

Results

The purpose of this research was to examine the effectiveness of a word level intervention on multiple reading component skills of adolescents with limited reading proficiency. The primary analysis used a multiple probe single case design for word identification, oral reading accuracy, rate, and prosody, and the secondary analysis tested for differences in strategy use, silent reading fluency, or sentence comprehension using non-parametric statistics. Visual analysis of baseline and intervention phase data across participants and across settings indicated a functional relationship between the word level intervention and multiple reading component skills.

A central goal of SCD is to determine whether a causal relation exists between the intervention and changes in dependent variables (Levin, O'Donnell, & Kratochwill, 2003); therefore, I compared data from the baseline phase to the intervention phase to visually assess the effect of TBS on word identification, oral reading accuracy, rate, and prosody for each student. Even though multiple dependent variables were monitored, the word identification score (a proximal data point) took priority in determining phase change. During the baseline phase, 5 of 6 students have upward slopping split middle trend lines. However, a stability judgement tool, using stability envelopes, was used to ensure consistency in decision making (Ledford & Gast, 2018). I calculated the number of probes that fit within the stability envelop based on the pre-determined level criterion of 40 percent to judge stability and used this envelop to deem the appropriate time to move to the intervention phase. Eighty percent of word identification scores fell within the stability envelop for 3 of 6 students, and 100 percent for 3 of 6 students. For two students with a word identification score outside the stability envelop, the score was lower than scores inside the envelop.

The trend judgement tool called the split middle method (White & Haring, 1980 as cited in Ledford & Gast, 2018) was used to compare trends between conditions due to the moderate or high variability within conditions expected. The accuracy of this method increases with additional data points; however, a minimum of four points per condition is required. For word identification, one student had a steeper upward trend line during the intervention phase than the baseline phase; two students had declining trend lines during the intervention phase; one student had a level trend line across both phases; and two students had less steep trend lines in the intervention phases as compared to the baseline phase. There was one demonstration of effect with clear level change for word identification; this particular score for the other five students was highly variable with high percentages of overlapping scores between phases, decreasing confidence in the existence of a functional relationship. While other data points were also moderately and highly variable, trends lines for accuracy and prosody scores had steeper incline during the intervention phase across students. In fact, for the prosody score, there was zero to 20% between-phase overlap for three of six students, 40% for two students, and 80% for one student, indicating a clear functional relationship for this reading component skill. One caution is that the percentage of overlap should not be used in isolation to determine between-condition behavior change. Visual analysis tools aid in the human decision to determine the effect shown by the intervention. In comparing results among all students, due to high percentages of overlap and high variability during the intervention phase for word identification, accuracy, and automaticity, a clear determination of reading skill change could only be made for prosody.

Lastly, the Tau-U post-hoc analysis showed an aggregated effect sizes of 0.1435 CI_{95} [-0.0229, 0.5969] for word identification; 0.5400 CI_{95} [0.3064, 1.3864] for accuracy during passage reading; and 0.1733 CI_{95} [0.0402, 0.6531] for automaticity (i.e., words read correct per minute), all of which indicate the intervention had a small effect on these dependent variables. For prosody, the Tau-U effect size was 0.7000 CI_{95} [0.3064, 1.700], indicating the intervention had a moderate effect on this reading component skill. For these calculations, the baseline was corrected on a case-by-case, theoretical and empirical basis (e.g., when there was a high

percentage of overlapping scores between conditions or the Tau-U trend level was ≥ .40 when contrasting conditions; Brossart, Laird, & Armstrong, 2018).

Social validity surveys indicated that teachers felt teaching adolescents reading skills was imperative to building their confidence and their success inside and outside school now and in their future lives, and students reported to have liked learning TBS and felt reading would be easier in varied settings in the future. Secondary analysis showed a significant effect for improved strategy knowledge and skill with a 0.90 effect size, but no statistically significant effects for silent reading fluency and sentence comprehension. To minimize potential for Type I error bias, Ledford & Gast (2018) recommend removing trend lines for final summative analysis and prior to disseminating graphed data for reader independent analysis. Detailed descriptions of visual analysis for each participant immediately follows.

Jack

Jack's word and passage reading data are presented in Figure 5. Jack received special education services in elementary school for a speech-language impairment. At the time of this study, his teacher described him as conscientious with his school work. During baseline, Jack's scores on the word identification probes ranged from 40% to 100% with a mean of 64%. While reading the grade-level passage during baseline, his accuracy scores ranged from 92% to 97% with a mean of 94.8%; his prosody scores ranged from 75% (12/16) to 81% (13/16) with a mean of 78.6%; and his WCPM ranged from 96 to 110 with a mean of 105.4. Upon implementation of TBS, the percentage of data points in the intended direction that overlapped with baseline scores were as follows: 100% for word identification, 80% for accuracy, 0% for prosody, and 60% for WCPM. These overlap percentages suggest a clear functional relationship between the intervention and prosody. Word identification scores ranged from 60% to 100%; accuracy scores ranged from 93% to 98%; prosody scores ranged from 88% to 94%; and 95 to 126 WCPM. Trend lines for multiple reading component skills during baseline and intervention slope upward, and WCPM remains relatively level throughout. On Jack's reading check passage sheet, there

was evidence of strategy-use as shown by notations written on the unknown words, and his strategy-use post-test score showed mastery at 83.33% correct.

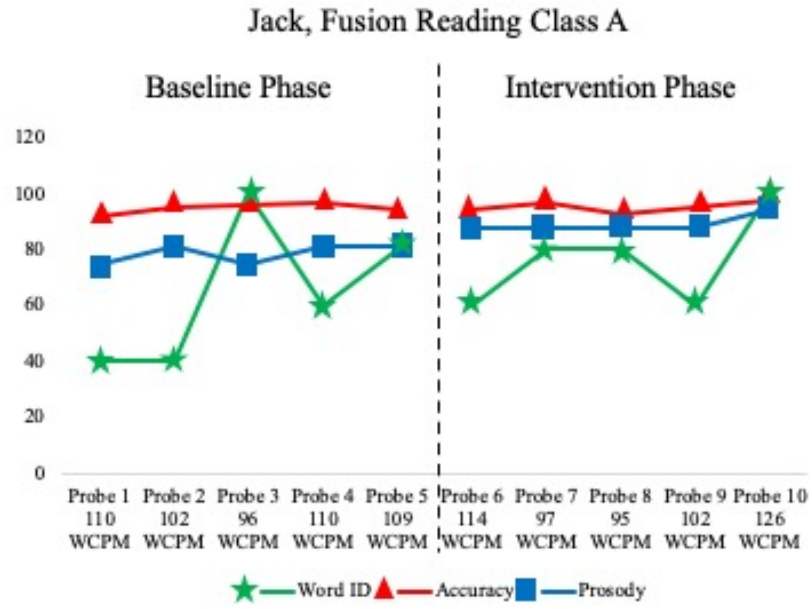


Figure 5. Jack's performance for each targeted skill reported as percentages and words correct per minute

Shane

Shane's word and passage reading data are presented in Figure 6. At the time of this study, his teacher described him as a *perfectionist* because Shane routinely asks to confirm that he has the correct answer before he submits his work and verbalizes disappointment and frustration with when he makes errors or mistakes. Shane has a strong work ethic. During baseline, Shane's scores on the word identification probes ranged from 40% to 100% with a mean of 72%. While reading the grade-level passage during baseline, his accuracy scores ranged from 85% to 96% with a mean of 91.2%; his prosody scores ranged from 56% (9/16) to 69% (11/16) with a mean of 65.2%; and his WCPM ranged from 68 to 96 with a mean of 81.2. Upon implementation of TBS, the percentage of data points in the intended direction that overlapped with baseline scores were as follows: 100% for word identification, 80% for accuracy, 40% for prosody, and 80% for WCPM. These overlap percentages suggest slight confidence in a

functional relationship between the intervention and prosody. Additionally, the prosody slope is the only reading component skill that was greater during intervention than during baseline. Word identification scores ranged from 60% to 80%; accuracy scores ranged from 90% to 97%; prosody scores ranged from 63% to 88%; and 78 to 99 WCPM. Across both phases, Shane's word identification scores were highly variable, thus yielded a level trend line. On Shane's reading check passage sheet, there was evidence of strategy-use as shown by notations written on the unknown words, and his strategy-use post-test score showed mastery at 85% correct.

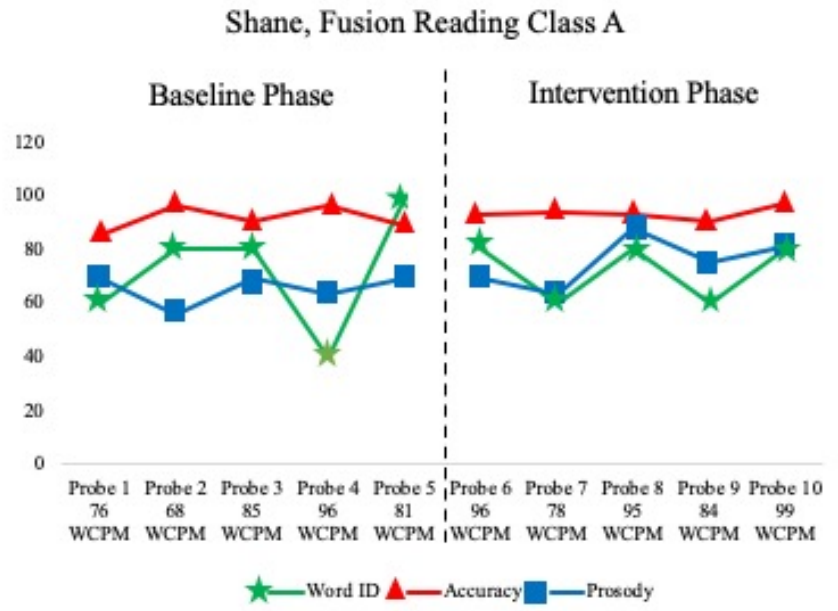


Figure 6. Shane's performance for each targeted skill reported as percentages and words correct per minute

Brady

Brady's word and passage reading data are presented in Figure 7. Brady verbalizes to his teacher that he does not want to be at school and he often attempts to socialize rather than participate in class tasks. A pattern, not visible in his graph nor in his scores, was that Brady routinely pronounced words in isolation incorrectly and pronounced the same words correctly during passage reading. During baseline, Brady's scores on the word identification probes ranged from 20% to 60% with a mean of 36%. While reading the grade-level passage during baseline,

his accuracy scores ranged from 87% to 92% with a mean of 90.4%; his prosody scores ranged from 56% (9/16) to 69% (11/16) with a mean of 61.4%; and his WCPM ranged from 69 to 95 with a mean of 80. Upon implementation of TBS, the percentage of data points in the intended direction that overlapped with baseline scores were as follows: 100% for word identification, 0% for accuracy, 20% for prosody, and 60% for WCPM. These overlap percentages suggest a clear functional relationship between the intervention and the dependent variables of accuracy and prosody. Additionally, trend lines for accuracy and prosody show greater upward slope during intervention than during baseline. During Probe 7, Brady forgot to read the five words into the recorder; thus, there is one missing score for word identification. Word identification scores ranged from 0% to 60%; accuracy scores ranged from 93% to 98%; prosody scores ranged from 69% to 81%; and 75 to 112 WCPM with the highest rate at the start of the intervention phase. On Brady's reading check passage sheets, there was limited evidence of strategy-use as shown by few notations written on the unknown words, and his strategy-use post-test score of 43.33% correct did not show mastery.

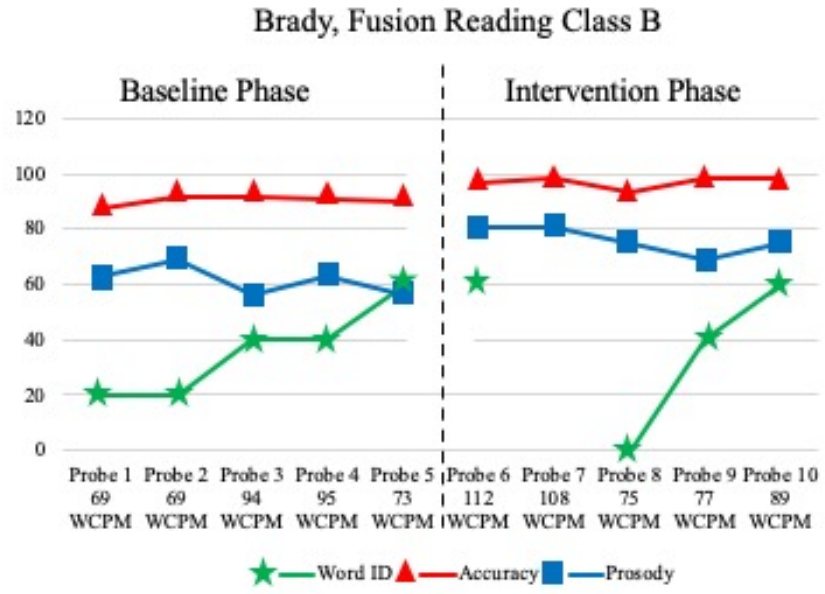


Figure 7. Brady's performance for each targeted skill reported as percentages and words correct per minute

Emily

Emily's word and passage reading data are presented in Figure 8. At the time of this study, Emily's teacher described her as easy-going and helpful and remarked that Emily reads and speaks very quietly. During baseline, Emily's scores on the word identification probes ranged from 20% to 60% with a mean of 48%. While reading the grade-level passage during baseline, her accuracy scores ranged from 84% to 94% with a mean of 88.6%; her prosody scores ranged from 63% (10/16) to 69% (11/16) with a mean of 65.4%; and her WCPM ranged from 114 to 164 with a mean of 140.2. Upon implementation of TBS, the percentage of data points in the intended direction that overlapped with baseline scores were as follows: 20% for word identification and accuracy and 0% for prosody. These percentages of overlap suggest clear functional relationships between the independent variable and several dependent variables. For Emily, the 100% overlapping scores for WCPM was meaningless because she needed to decrease rate in order to increase accuracy. Word identification scores ranged from 60% to 100%; accuracy scores ranged from 93% to 97%; prosody scores ranged from 75% to 88%; and 134 to 171 WCPM. Emily hit the therapeutic ceiling for the 2nd and 3rd intervention word identification probes and showed clear effect between baseline and intervention by the low percentage of overlap in the intended direction. However, while the trend line during baseline goes up within the stability envelop; the trend line during intervention goes down. Trend lines for accuracy and prosody show greater upward slope during intervention than during baseline. On Emily's reading check passage sheets, there was limited evidence of strategy-use with notations written on the unknown words; however, her strategy-use post-test score of 75% was near mastery.

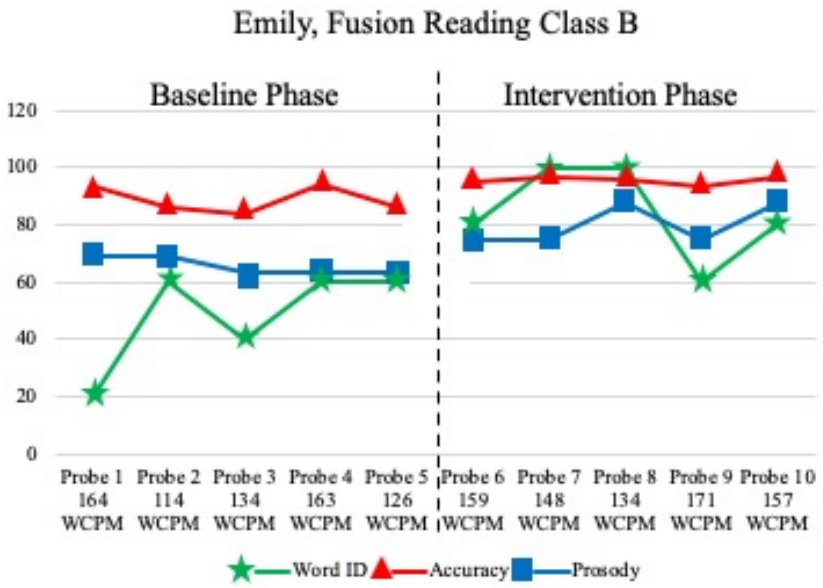


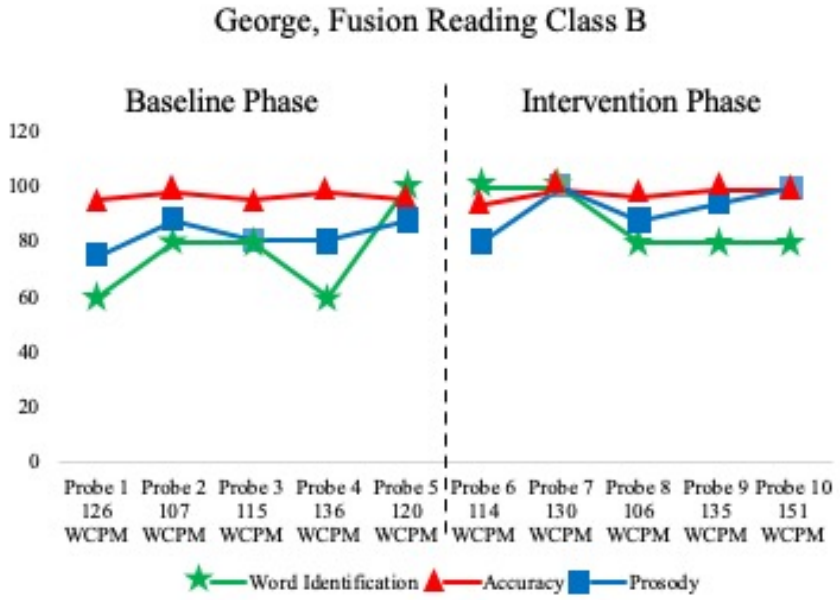
Figure 8. Emily's performance for each targeted skill reported as percentages and words correct per minute

George

George's word and passage reading data are presented in Figure 9. George has a 504 Plan to address attention-deficit hyperactivity disorder. During class, he frequently answers to questions posed to the whole class and demonstrates high levels of active participation and engagement. During baseline, George's scores on the word identification probes ranged from 60% to 100% with a mean of 76%. While reading the grade-level passage during baseline, his accuracy scores ranged from 95% to 98% with a mean of 96.2%; his prosody scores ranged from 75% (12/16) to 88% (14/16) with a mean of 82.6%; and his WCPM ranged from 107 to 136 with a mean of 120.8 Upon implementation of TBS, the percentage of data points in the intended direction that overlapped with baseline scores were as follows: 100% for word identification, 40% for accuracy and prosody, and 80% for WCPM. These percentages of overlap suggest slight confidence in functional relationships between the intervention and the dependent variables of accuracy and prosody. Word identification scores ranged from 80% to 100%; accuracy scores ranged from 94% to 99%; prosody scores ranged from 81% to 100%; and 106 to 151 WCPM. George hit the therapeutic ceiling for the last baseline and first intervention word identification

probes and maintained a high level of mastery for the remainder of the intervention phase with 80%; however, while the trend line during baseline goes up (within the stability envelop), the trend line during intervention goes down. Across both phases, his greatest, and clearest improvement was shown in his prosody scores. Comparing the average for automaticity during baseline with his final automaticity score shows improvement as well. On George's reading check passage sheets, there was limited evidence of strategy-use with notations written on the unknown words, yet his strategy-use pre-test score of 71.67% was close to mastery.

Figure 9. George's performance for each targeted skill reported as percentages and words correct



per minute

Nube

Nube's word and passage reading data are presented in Figure 10. Nube's word and passage reading data are presented in Figure 10. Nube moved to the United States a year prior to the start of this study, as such she has very limited English speaking, listening, and reading skills. She is learning English as her second language, and her teacher reports that Nube exhibits eager-to-learn behaviors by listening and following instructions carefully. During baseline, Nube's scores on the word identification probes ranged from 60% to 80% with a mean of 64%. While

reading the grade-level passage during baseline, her accuracy scores ranged from 88% to 92% with a mean of 90%; her prosody scores ranged from 56% (9/16) to 69% (11/16) with a mean of 64%; and her WCPM ranged from 67 to 86 with a mean of 76.6. Upon implementation of TBS, the percentage of data points in the intended direction that overlapped with baseline scores were as follows: 100% for word identification, 40% for accuracy, 80% for prosody, and 100% for WCPM. These percentages of overlap suggest a slight functional relationship between the intervention and accuracy. During the intervention phase, Nube experienced an implementation dip for word identification as her first two probes decreased; however, the trend line for word identification was steeper than during baseline. Word identification scores ranged from 40% to 80%; accuracy scores ranged from 86% to 96%; prosody scores ranged from 50% to 81%; and 69 to 83 WCPM. Overall, scores for multiple reading component skills were highly variable. On Nube's reading check passage sheets, there was no evidence of strategy-use, and her strategy-use post-test score was 36.67% correct.

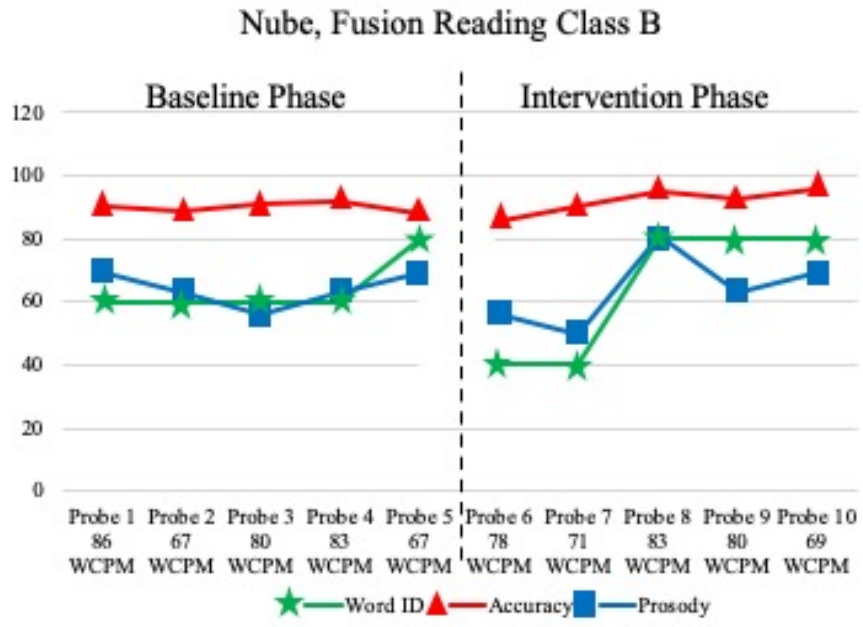


Figure 10. Nube's performance for each targeted skill reported as percentages and words correct per minute

Secondary Analysis

The median pre-test scores and post-test scores for each factor (strategy use, silent reading fluency, and sentence comprehension) are shown in Table 2. Normality tests on the data provided evidence that scores in the sample are not normally distributed. Specifically, Z-values for skewness and Kurtosis were outside the -1.96 and +1.96 range. For strategy-use, the medians of Group A (i.e., pre-test scores) and Group B (i.e., post-test scores) were 23 and 44, respectively. A Wilcoxon Signed-rank test showed that there is a significant effect of Group ($W = 0$, $Z = -2.2014$, $p < 0.05$, $r = 0.90$), and the magnitude of effect for strategy-use is large. For silent reading fluency, the medians of Group A and Group B were 30th percentile and 32nd percentile, respectively. To note, Nube had a difference score of zero (i.e., no change); therefore, the test discarded her score from the analysis and reduced the sample size. Based on a p-value threshold of 0.05, there was not a statistically significant difference between Group A and Group B. For sentence comprehension, the medians of Group A and Group B were 9 and 13, respectively. To note, while a very high score, George had a difference score of zero (i.e. no change); therefore, the test discarded his score from the analysis and reduced the sample size. Based on a p-value threshold of 0.05, there was not a statistically significant difference between Group A and Group B. In regards to the hypothesis made for these distal data points, the median scores for each reading components skill was higher upon post-test, however not to a statistically significant degree.

Table 2.

Pre-test and post-test scores and medians

		Pre-Test	**Post-Test**	**Matched Pair Difference**
Strategy-Use (TBS Pre-/Post-test)	Jack	46.67% (28/60)	83.33% (50/60)	+36.66% (+22 points)
	Shane	51.67% (31/60)	85.00% (51/60)	+33.33% (+20 points)
	Brady	36.67% (22/60)	43.33% (26/60)	+6.66% (+4 points)
	Emily	40.00% (24/60)	75.00% (45/60)	+35.00% (+21 points)
	George	30.00% (18/60)	71.67% (43/60)	+41.67% (+25 points)
	Nube	8.33% (5/60)	36.67% (22/60)	+28.34% (+17 points)

		Median Score: 38.33% (23/60)	Median Score: 73.33% (44/60)	Median Difference: +35.00% (+20 points)
Silent Reading Fluency (TOSCRF)	Jack	84 %ile	58 %ile	-26 %ile
	Shane	45 %ile	32 %ile	-13 %ile
	Brady	8 %ile	30 %ile	+22 %ile
	Emily	23 %ile	47 %ile	+24 %ile
	George	30 %ile	23 %ile	-7 %ile
	Nube	<1 %ile	<1 %ile	No change
		Median Score: 30 %ile	Median Score: 32 %ile	Median Difference: 2 %ile
Sentence Comprehension (GRADE)	Jack	10/19	13/19	+3 points
	Shane	9/19	13/19	+4 points
	Brady	11/19	14/19	+3 points
	Emily	9/19	17/19	+8 points
	George	18/19	18/19	No change
	Nube	6/19	2/19	-4 points
		Median Score: 9/19 (3rd Stanine; 12-23 %ile)	Median Score: 13/19 (5th Stanine; 41-60 %ile)	Median Difference: +4/19 (+2 Stanines; +29-37 %ile

Social Validity

In regards to social validity, this study focused on how individual students responded to a word-level intervention. The magnitude of change in the dependent variables resulting from the intervention were socially important. The setting was a typical intervention-size classroom with 4-6 students learning from a licensed teacher who had professional development in the use of an evidence-based intervention with accompanying materials. Consequently, the context for implementation of the independent variable was practical, cost effective, and replicable, and student outcomes were socially meaningful, evidencing high quality indicators for SCD (Horner et al., 2005). Interestingly, both Fusion teachers, independent of each other, reported how rewarding it was to see students' *confidence* in reading grow and flourish. Five of six students

reported that they liked learning TBS (Brady reported "it was okay"), and all students reported that reading will be easier now in core classes, elective classes, and at home. Shane wrote on his survey that "words I don't know are easier to figure out [now] that I have learned the Bridging Strategy." Survey results showed students liked learning TBS and believed it will help them read easier in other classes and at home. The effectiveness of TBS differed by student and by skill.

Word identification. Based on the high frequency of overlapping scores and the low Tau-U effect size (0.1435), word identification of researcher-predicted unknown multisyllabic words read in isolation may not have been the best proximal data point to determine phase change and to examine initial results for demonstrations of effect. Only one student, Emily, showed clear level change for word identification between baseline and intervention conditions; however, many students showed latent level change for prosody, described below.

Accuracy during passage reading. Prior to the study, the selected 9th grade passages were expected to be at frustration or instructional levels for most, in not all, students participating in TBS. When students read with 99% accuracy, a passage is considered appropriate for independent reading, and with 95% accuracy, a passage is appropriate for use during instruction with teacher support. For Jack and Shane, across both conditions as shown by 80% of overlapping scores, the passages were in the frustration to instructional ranges. Their individual results decreased the group effect size for accuracy; however, it was still moderate at 0.5400. For George, the passages were within an instructional range during baseline, and he read the passages during the intervention phase with an accuracy level indicating independent reading. For Brady and Emily, their accuracy scores during baseline showed the passages were at a frustration level, yet by the end of the intervention phase, their accuracy level had moved to an instructional level. To note, in order to achieve improved accuracy, Emily's rate required a decrease. Lastly, Nube read with accuracy at the frustration level through baseline and approached instructional level by the end of intervention.

Automaticity. Through both conditions, automaticity scores (WCPM) were so variable as to create relatively level trends with 60-100% overlap for all students and generate a small Tau-

U effect size (0.1733). Norms for grade level expectations of WCPM are not established for 9th grade; however, TBS instructor's manual states that fluency mastery is 125-150 WCPM (Deshler et al., 2012), and Raskinski et al. (2017) propose that 147 WCPM while reading for comprehension is at the 50th percentile for college-ready students. During strategy instruction, each of these students showed mastery within this automaticity range for ability level passages and for a passage at least one level above their reading level. During assessment probes, the 9th graders read passages approximated at the 9th grade level. George and Emily read between 125-150 WCPM during baseline and intervention, and Shane, Brady, and Nube never reached this range. Jack was the only student who saw slight improvement in WCPM, although he did not reach the recommended proficiency range. Moreover, past findings suggest the error inherent in WCPM scores may have a small but meaningful influence on the Tau-U statistic obtained (Klingbeil, Van Norman, McLendon, Ross, & Begeny, 2019).

Prosodic reading. The prosody score captures other dimensions of oral reading fluency (accuracy and rate during passage reading in addition to reading with expression, stress and intonation, phrasing, and volume), and may have a relationship with reading comprehension (e.g., Rasinski et al., 2009; Paige et al., 2012 & 2014). Prosody was assessed based on the Multi-Dimensional Fluency Scale, which states that a score of 8 or below indicates a need for intervention, and a score of 10 or more indicates the reader is making good progress in reading. During baseline, none of the students' scores for prosody were in the range indicating a need for prosody-related intervention; however, half of the students were also below the score that indicates a reader is making good progress, and all of the students improved their prosody during the intervention phase (large effect size of .70). As a final note, one criticism of the Multi-Dimensional Fluency Scale is that it does not include a pace descriptor to score a "racing-reader," like Emily.

Beyond the numbers. Some results were impossible to discern from the numerical scores. First is the increased clarity in Nube's pronunciation. English was not Nube's dominate spoken language, and TBS taught her pronunciation and spelling rules, syllabication patterns, and

common beginning and ending sounds for English words. Additionally, Shane and other students often added the suffix "s" to words during passage reading and switched "the" to "a" and vice-versa; thus, decreasing accuracy scores, yet may not have negatively influenced comprehension. Finally, Emily moved towards a more appropriate pace to aid understanding and accuracy (rather than speed-reading), which resulted in a suitably declining automaticity score. While listening to students read, teachers are able to discriminate areas of strength and for improvement.

Discussion

This study adds to a scant evidence-base on fluency interventions (Wexler, Vaughn, Edmonds, & Reutebuch, 2008) and teaching word reading skills (Joseph & Schisler, 2009) to address the unique needs of adolescents with limited reading proficiency. Results of this study indicate that the Bridging Strategy, one of seven units taught within the Fusion Reading program, shows promise for improving multiple reading component skills among 9th graders with diverse reader profiles. Across two different Fusion Reading classrooms, all students experienced growth in strategy-use (0.90 effect size) and prosodic reading of 9th grade level passages (0.70 effect size), and each student experienced varied degrees of growth for nearly each reading component skill (ranging from 0.14 to 0.54 effect size per skill).

Past group-design studies on the effectiveness of the two-year, comprehensive Fusion Reading program showed moderate to large effect sizes for reading comprehension, using total scores on the GRADE (Hock et al., 2016; Hock et al., 2017). The current SCD study used the Sentence Comprehension subtest from the GRADE, intended to tie directly to the skills taught during the specific intervention under study (TBS), one of seven units within the comprehensive Fusion Reading program. While not showing statistically significant group gains, there were individual gains for four of six students. Another previous Fusion Reading study that examined its effectiveness after one year of the program found statistically significant differences between the experimental and comparison conditions for silent reading fluency, using the TOSCRF (Brasseur-Hock, Miller, Washburn, Croust, & Hock, 2019). Again, although the current study did not find statistically significant gains across the group of students, two of six students

showed improvement on this distal data point after TBS instruction. In sum, as a *group*, improved strategy-use (proximal data point; 0.90 effect size) did not yield significant differences in their silent reading fluency nor their sentence comprehension (distal data points); however, in viewing results at the individual level, students with improved strategy-use showed like gains in reading component skills. In other words, for the present study, the aggregated degree of change was not powerful enough to detect significant effects for silent reading fluency and sentence comprehension using of non-parametric analysis.

This study's results also align with Joseph and Jolivette's (2016) broad findings that peer-mediated repeated reading is an effective intervention for high school readers. TBS uses peer-mediated repeated reading for students to practice their word identification skills with multisyllabic words and to practice reading fluency by reading for accuracy, reading for speed, and reading for understanding. However, while both studies used SCD methodology to examine the effectiveness of seemingly similar interventions, Joseph and Jolivette measured rate and comprehension as their outcome measures; whereas, the present study on TBS measured word identification, accuracy, automaticity (rate and accuracy combined), and prosody. The present study found improvements occurred for different reading component skills per student during visual analysis and did not detect *group* effects for comprehension improvement due to its limited pre/post measurement as part of a secondary analysis. Additionally, the current study found that oral reading rates fluctuated for each individual. The comparison between these two studies draws attention to the importance of alignment between taught skills and measured skills.

Connections to Reading Theory

Multiple reading theoretical frameworks were integrated to guide the design and analysis of this SCD study. In theory (i.e., the information processing theory; LaBerge & Samuels, 1974), when readers improve their word identification skills, they will improve their accuracy, which will lead to improved rate (not necessarily quicker pace, but more appropriate). The SVR influences the demonstrated skills named above because adequate decoding and linguistic comprehension make appropriate pace and intonation possible. The Complete View of Reading

adds expected variability in skill due to text difficulty and the reader's familiarity with the subject matter to the SVR model, meaning rate can fluctuate while accuracy and prosody remain high. Thus, these intact reading component skills would yield prosodic reading with comprehension.

In the current study, when the purpose for reading was to understand, four of six students improved both accuracy and prosody scores while the other two students remained relatively the same for accuracy across conditions yet still improved prosodic reading during the intervention phase. The results also indicate that a prosody score alone may represent the entire ORF construct (Paige et al., 2012 & 2014; Rasinski et al., 2009), given that the Multidimensional Fluency Scale, used in this study, includes a rubric for expression and volume, phrasing, smoothness, and pace. Prosody, as a measured skill, has received limited attention in reading studies in the past; however, this appears to be a growing area of focus for reading researchers. Nomvete and Easterbrooks (2020) investigated the predictive nature of passage-reading rate, syntactic awareness, and phrase-reading ability (one component of expressive prosody) among seventy adolescents with limited reading proficiency. While their study found that all three skills were significant predictors of reading comprehension, phrase-reading ability was the strongest predictor and functioned as a mediator between syntactic awareness, passage-reading rate, and reading comprehension. Thus, adolescent reading researchers should continue to examine prosodic phrase-reading ability as a tool for improving reading comprehension.

Limitations and Implications for Future Research

There are a few unknowns clouding a definitive evaluation of the differential effectiveness of TBS on participating students and potential generalization to other populations. Three limitations of the present study may prompt action for future reading researchers. Vocabulary and background knowledge were uncontrolled cofounding variables; reading comprehension of passage reading was not included in the probe sets during baseline and intervention phases; and the SCD lacked the rigor required for strong internal validity and confidence in findings.

Francis, Kulesz, and Benoit (2018) cautioned reading researchers that if readers use their component skills in different ways or are impacted in different ways by text features and familiarity with the subject-matter, then improving specific reading component skills may not result in significant, measurable comprehension improvements. As such, variables will show variability when comparing students to each other and to themselves. The present study attempted to control for text features and difficulty by using narrative and expository passages within a Lexile range for 9th graders, but it could not account for student's background knowledge with the topics covered in the passages. For instance, vocabulary knowledge is a known predictor to adolescent literacy skill development (Dennis, 2012; Eason, et al., 2013; Kamil, Borman, Dole, Kral, Salinger, & Torgesen, 2008). Vocabulary knowledge influenced student performance in the present study when students did not realize if they were pronouncing words in isolation correctly or incorrectly. During passage reading, students were able to use context clues to confirm or reject the accuracy of their pronunciation, and this is effective when they recognize the given word from their spoken vocabulary. In many instances, they self-corrected mispronunciations and this was not counted as a miscue. Ehri (1999) confers that the role of natural spoken language development and reading development typically keeps pace with each other; however, around adolescence there is a shift towards words in text that are outside the spoken repertoire due to distinctive spoken and written language within each discipline. These factors are built into strategy instruction, but they may have negatively influenced the word identification score for some students with some passages.

Additionally, more needs to be known about how distinct word-level skills engage with phrase-level reading and sentence-level reading to yield passage comprehension. Because pre/post analysis of sentence comprehension did not show a group effect and reading comprehension was not included in the repeated assessment probing during conditions, this study could not offer new conclusions in this needed area. Moreover, the current study could not confirm Tolar and colleagues' findings (2014) that ORF (measured as WCPM; accuracy and rate combined as an automaticity score) was not generally a predictor of RC; however, this study

could confirm their findings that slope validity is greater for skills most closely aligned to purpose of the intervention, which was to improve reading for understanding by increasing students' skills for pronouncing multisyllabic words.

This study shows promise for the use of single case design to evaluate reading interventions and to monitor reading skill growth. Corroborating a latency effect of reading skill change in another single case study by Regan, Berkeley, Hughes, and Kirby (2014), changes in reading component skills were incremental and latent. Additionally, even though weak correlations between Tau-U effect size calculation and visual analysis have been suspected (Brossart et al., 2018), in this case, there was correlation in that demonstrations of effect were clearer for prosody than the other reading component skills. Statistical analysis (Tau-U) supported visual analysis with aggregated small effect sizes (0.14 to 0.54) for word identification, accuracy, and automaticity, and one moderate effect size (.70) for prosody. Reading researchers should consider the use of rigorous, experimental SCD not only for pilot studies to show promising evidence for large randomized control trials (which help researchers understand what works for the average subject), but also as follow-up studies to understand the mechanisms and processes by which an intervention works for individuals (who tend toward outlier points on a normative curve) and under what conditions.

The current study did not establish undoubtable, strong experimental control to indicate great internal validity. To improve SCD rigor and its use as an experimental methodology, randomization could have been used with student selection, teacher selection, and randomized starts for the intervention phase. Additionally, this study looked at both separate cases together, attempting to determine any cross-cutting themes that occur in two different settings, and looked at cases in contrast to each other to notice patterns that lead to different outcomes. However, there were not enough classrooms to draw firm comparisons across settings. This study was limited by the number of teachers in Virginia not only available and willing to participate, but also those implementing FR daily, needed for like comparisons. In studies of reading

interventions at the secondary level, this challenge is not uncommon; thus, researchers should seek grant funding for resources to expand SCD of reading interventions into multiple states.

Implications for Teacher Practice

A typical challenge for any efficacy study is ensuring that the treatment is implemented as intended. This study included four fidelity checks indicating both teachers implemented with a high degree of fidelity which corresponded with meaningful reading skill growth. Given the two study teachers had different certification backgrounds, different lengths of time as teachers, and different professional learning experiences on how to instruct Fusion Reading, the likelihood of adequate implementation for other teachers is high. One reason is the supportive nature of the Fusion Reading teaching materials (i.e., an instructor's manual, presentation visuals, student workbooks, and online professional learning modules).

Although both teachers implemented with fidelity, there were dissimilarities in their instructional delivery style, management of student behaviors, eliciting of student engagement, and coping with mixed student motivation for learning, all of which characterize the complexity of problems of practice (Kennedy, 2016). The study teacher with more experience and more extensive professional learning showed increased integration of the TBS into his teaching practice through his use of personalized language and fluidity among the strategy steps. In other words, through increased experiences, reflection on practice, and growth in classroom application, his explicit knowledge of TBS had advanced into tacit knowledge in his teaching habits (Grossman, Smagorinsky, & Valencia, 1999). Given this study only included two teachers with a few students each, these observations related to their influence on student learning are limited; thus, future research could explore how teachers move from initial learning with a new practice to integrated and accomplished use of a practice and its impact on student outcomes (Brownell, Jones, Sohn, & Stark, 2020).

Another point for consideration is that teachers were generally unaware of deviations from fidelity until discussed. While accomplished implementers will make intentional adaptations to peripheral components of an EBP based on student needs and contextual factors in

order to enhance student learning (Leko, 2015), these deviations were unintentional due to misunderstanding fine-grain elements of the teaching procedures. This phenomenon, in addition to the nuances of implementing in unique classroom contexts described above, underscores the importance of collaboration with others while implementing an evidence-based practice (e.g., instructional coach, professional developer, other teachers implementing the same EBP). Our field would benefit from future research regarding the importance of coaching to help teachers reach higher levels of integration of the practice into their teaching habits.

Implications for School Improvement Leaders

This study set out to discover for whom and under what conditions an evidence-based reading intervention, meticulously-designed around and aligned with key findings from the science of learning and theoretical underpinnings from the science of reading, would work. Among key findings, the science of learning indicates that opportunities for growth and change persist across the development continuum; variability among individuals is the norm; and each individual's development is non-linear due to neural plasticity and brain malleability in response to learning tasks and the environment (Cantor et al., 2019). Nonetheless, factors complicating the interpretation of results from the present study are the same factors that influence effective-use of EBPs in schools. First, appropriate placement of students into intervention courses using a comprehensive assessment protocol (Torgesen & Miller, 2009; Washburn & Billingsley, 2018) to match student needs with the degree of intensity and explicitness required is critical. Second, infrastructure support provided by district and school administration, such as how the intervention fits within the master schedule (e.g., stand-alone elective or embedded into an English course with competing curricular demands), ensuring protected instructional time (e.g., without classroom interruptions nor removing and adding students partway through the intervention), and providing resources to implement the EBP effectively play significant roles in influencing positive student outcomes (Bryk, 2015; Bryk, Gomez, Grunow, & LeMahieu, 2015; Fixsen, Blase, Metz, & Van Dyke, 2015). Last, but certainly not least, school improvement efforts and research are needed that centers professional learning experiences as partnerships

with teachers to implement EBPs within the realities of their classroom context (Darling-Hammond, Hyler, Gardner, 2017; Joyce & Showers, 2002; Kennedy, 2016; Knight, 2007; Knight & Hock, 2012).

In conclusion, the sample for this study represents the diverse group of readers found in today's high school reading intervention courses and provides additional evidence to support the reality of heterogenous profiles of adolescent with limited reading proficiency. Participating students varied in many ways (e.g., motivation to learn, background factors, character traits, and reading skill profiles), yet survey results showed each student liked learning TBS and believed it will help them read easier in other classes and at home. Additionally, grounded in research on brain malleability and plasticity (Cantor, Osher, Berg, Steyer, & Rose, 2019), adolescent readers *can* train their brain to decode more efficiently by learning syllable types, spelling rules, and common word beginnings and endings to improve their prosodic reading.

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Chapter 4

Teaching Secondary Students Literacy Skills for Content Learning

Washburn, J. (2017). Teaching secondary students literacy skills for content learning. In J. Bakken (Ed.), *Classrooms: Academic content and behavior strategy instruction for students with and without disabilities*. Hauppauge, NY: NOVA Science Publishers.

As students progress through middle school and high school grades, literacy demands become more challenging as content instruction typically involves not only more reading, but texts with greater complexity (e.g., length, structures, reading level, vocabulary, data, including figures and tables) as well as increased expectations for writing, speaking, listening, and thinking. Even students leaving elementary schools with on target literacy skills do not automatically acquire advanced literacy skills on their own, rather, they need instruction and support to learn and apply new skills to complex texts and other content learning tasks (International Reading Association, 2012). To address students' literacy needs and continue their literacy development, secondary teachers need to help students use evidence-based strategies in the context of content instruction, both to acquire and to apply the unique literacy strategies relevant to their content areas and the associated, sophisticated genres.

The purpose of this chapter is to provide teachers with a summary of specific instructional strategies, using a planning process, so that students become strategic learners and achieve proficiency with advanced, disciplinary literacy. This chapter includes a description of each strategy and recommendations for its use, practical examples, and specific teacher resources for further professional learning.

Literacy for Content Learning

Becoming a proficient and literate adult in any field is mediated by middle and high school classroom experiences; thus, goals for literacy at the secondary level impact all teachers and can become a school-wide effort. When secondary teachers are charged with increasing the

literacy levels of their students, there is a tendency to react as if all teachers are being asked to teach reading. However, achieving literacy is about the listening, speaking, reading, writing, thinking, and reasoning skills and strategies necessary to learn in each content area (Ehren, 2005). Examples of generic content literacy skills include fluent reading, paraphrasing and summarizing, writing varied complete sentences, and engaging in two-way communication. When a set of effective classroom routines and practices are implemented across a school, students are able to generalize their skills into multiple settings and situations, which leads to powerful effects for literacy growth.

Although there are literacy learning and application methods that apply generally in all content areas, there are those which are effective for specific situations and specialized per discipline (Shanahan & Shanahan, 2008). For example, while reading in history class, students evaluate the source of their reading material to determine credibility or build awareness of positions taken by the author; whereas, in math, a primary goal for reading is to identify errors or locate "truths" in the text, making re-reading a major strategy. Additionally, students in career and technical education courses engage in highly technical reading tasks that involve analyzing, summarizing, interpreting, and predicting in complex and authentic non-linear text (Gillis, et al., 2016; Haynes, 2015). See Table 1 for more examples. Thus, reading in each discipline requires adolescents to be cognizant of the varying skills required by the text.

Table 1.

Examples of Disciplinary Literacy Practices

History **(Shanahan & Shanahan, 2008)**	Science **(Shanahan & Shanahan, 2008)**	Math **(Shanahan & Shanahan, 2008)**	English **(Rainey, 2017)**	Career & Technical Education **(Gillis, et al., 2016)**
• **Sourcing** • **Corroboration** • **Context**	• Visualization • Prediction • Observation • Analysis • Summarization	• Arriving at "truth" • Heavy emphasis	• Seeking patterns • Identifying strangeness	*Agriculture*: • Solve problems

	• Representations of information processed recursively	on error detection • Importance and precision of every word • Rereading	• Articulating a puzzle • Considering possibilities • Considering contexts • Making a claim	• Improve or create a project • Obtain an overview of a system *Business*: • Data analysis • Select and use graphic aids • Analyzing • Interpreting • Predicting

In middle and high schools, both content literacy and disciplinary literacy are required for all students to develop advanced literacy levels and achieve content mastery regardless of literacy competency (Faggella-Luby, et al., 2012). Adolescents who are struggling with reading need continued instruction and interventions to bolster their basic reading skills and to become strategic readers successful with both content and disciplinary literacy tasks. Non-struggling readers and struggling readers alike need instruction and support. Shanahan and Shanahan (2008) describe how moving from class to class with different subject matters and different teachers is comparable to culture shock experienced traveling the world. The classroom culture are the routine and norms established to learn specific academic disciplines; therefore, there will be cultural differences in how information is used, the nature of language, and demands of discipline-specific tasks.

Chapter Overview

To answer the question, what teaching behaviors make discipline-specific reading tasks, mastery of concepts and vocabulary, and the volume of content accessible to all learners?, the following literacy components will be elaborated on: 1) reading, 2) writing, 3) vocabulary, and 4) speaking and listening. Each section of this chapter will begin with planning considerations to identify the best teaching strategies for content learning.

Planning Considerations

Considering the perspectives and experiences of each level of learner (i.e., advanced, average, struggling, and novice) in the classroom is an essential part of the planning process. Teachers should attempt to view their discipline not only through the lens of a historian, mathematician, scientist, or literary expert, but also through their students' eyes. This may be difficult for teachers who feel passionate about their subject matter or for whom learning came easy during their school years. To make content accessible for a variety of learners, teachers can collaborate with each other to simplify their content or break it into parts. Individuals to seek out for this purpose are colleagues in different departments, special education teachers, instructional coaches, and reading specialists.

The following considerations are an adapted, condensed version of the SMARTER Instructional Cycle, designed to guide teachers through instructional decision making using formal and informal student data and curriculum analysis as an ongoing process (Lenz, 2016).

- **How developed are students' knowledge and skills for the key topics and concepts within the unit?** Administer and review pre-assessments to make decisions about which topics or concepts will require elaborate, explicit instruction versus ones that will require a review or brief explanation for a few, some, or all students. In the assessment, include tests of critical prior knowledge, in order to predict potential learning difficulties due to limited retention of knowledge or skills taught in previous lessons, units, or courses.
- **What essential questions will guide higher level thinking about the key topics and concepts?** Develop questions that are broad, foundational, and permeating, drawn from standards that guide teaching and learning. Create visual maps (i.e., graphic organizers) to support the concepts to be taught in order to answer these essential questions.
- **What key topics, sub-topics, or concepts will require elaborate, explicit instruction?** Analyze topics, big ideas, and concepts for complexity, ambiguity, volume, and relevance to students. These are signs indicating the need for explicit and engaging instruction to increase meaning and memory of new learning and to access higher level thinking. Explicit instruction involves teaching in a systematic way by emphasizing learning goals

and by using precise instructions, teacher modeling, guided practice, and independent practice with feedback (Archer & Hughes, 2011).

Reading

From the beginning of their reading journey, students are familiar with narrative text (e.g., oral stories, picture books, short stories, and novels); however, in middle and high school, text becomes primarily expository in nature (e.g., textbooks, articles, and primary source documents). This can present a challenge for struggling readers due to unfamiliarity and a lack of strategies to interact with expository text. Each discipline uses certain text or knowledge structures more frequently than others. For example, science text contains more graphics than other text, and social studies text use analysis and evaluation of perspectives, arguments, and interpretations using proposition (Baxter & Reddy, 2007). To comprehend various discipline-specific texts, readers must be strategic in their approach before, during, and after reading. While reading, there are multiple cognitive actions taking place simultaneously: integration of background knowledge and experiences with ideas in the text, use of context clues to determine meaning of new vocabulary, and awareness of language structure and genre (Ehren, Lenz, et al., 2004; Snow & Biancarosa, 2003). Hence, teachers in all content areas need to provide explicit comprehension strategy instruction with varied text (Kamil, et al., 2008).

Preparing to Embed Strategy Instruction

Knowledge of two elements—literacy demands of selected text and explicit comprehension strategy instruction—guide teacher decisions for embedding comprehension strategy instruction with disciplinary-specific text.

Examine potential learning difficulties. Teachers need to know the reading level of the text and the reading ability of his or her students. The reading level of a text is influenced by the length and complexity of the sentences and the frequently of words used in the English language. For example, prior to reading text rich with academic language and discipline-specific vocabulary, students will benefit from pre-teaching vocabulary and concepts that are key to understanding. Additionally, if a teacher knows the reading ability of each student, there are free

online resources that provide fiction and non-fiction passages at a range of reading levels (e.g., www.newsela.org and www.readworks.org). Once text has been selected, discovering students' familiarity with a topic or concept prior to reading, helps guide pre-reading strategies. For instance, if students will be reading about a new technology used as part of airport security, a teacher would want to know which students have flown before, particularly if the community is not located near an airport.

Determine text structure. Text structure is how experts organize, construct, and represent knowledge in text. Examples of expository text structure are cause/effect, problem/solution, comparison/contrast, chronological order or sequence, concept idea with examples, and proposition with support (Baxter & Reddy, 2007). Knowledge can be represented by the organization of the text through language (e.g., transition words), sections in the text, and visual mapping of big ideas and relationships among concepts. Examples of knowledge structure are hierarchal, linear, cyclical, and cluster (Turner & Colombo, 2009).

Develop or select a graphic organizer. Knowledge structure can be represented with graphic organizers, (i.e., visual devices, semantic maps, and knowledge, concept, content, or visual mapping). As described above, expository text takes many forms; therefore, the graphic organizer will vary based on the specific structure of the text. When students use graphic organizers that match text structure, they are able to visualize the relationships among concepts thereby using the tool for increased comprehension of the text. Thus, teachers need to determine the structure within the selected text prior to developing or selecting a graphic organizer. *Differentiated Visual Tools™*, https://makessensestrategies.com, provides numerous specialized graphic organizers that merge content and strategic learning in order to increase clarity of complex instruction (Ellis, retrieved February 15, 2017).

Craft an essential question. Sharing one or more essential questions prior to reading activates thinking while reading. The same question(s) can be used during post-reading to discuss new learning. The verb used in the question(s) may connect to the type of thinking represented by the text structure and required in learning standards.

Identify pause points within text. Determine and mark logical points in the text for discussion, completion of a portion of the graphic organizer, annotation with questions or big ideas, or think aloud. *Think aloud* is a powerful method for teachers or students to share verbally their thought-process, including problem-solving, reflections, and self- questioning while reading.

Incorporating Strategy Instruction

Teachers need to provide guidance to students before, during, and after reading. Teachers can facilitate active engagement in the reading process by using particular instructional routines and procedures to encourage inner- and inter-dialogue to make sense of text. The following are recommendations regarding the delivery of explicit, comprehension strategy instruction.

1. **Share the goal for reading**. This may take the form of a statement, such as *to gain multiple perspectives about the causes and effects of the Civil War.* Another option is to pose 1-2 essential questions or request that students preview the text and generate their own questions.
2. **Provide guidance before reading.** With students, preview the text structure and text features (e.g., headings, bold or italics words, graphics, glossaries, items in the margins, chapter summaries, bibliographies, and data in the form of figures and tables). Also, introduce critical concepts, key topics, and vocabulary through exercises such as graphic organizers. See the section on vocabulary for details.
3. **Model and practice.** First, describe the text structure and selected graphic organizer serving as a general or discipline-specific strategy to process discipline- specific text. Next, demonstrate the use of the selected graphic organizer with think aloud. As an illustration, a teacher could read the first paragraph and think aloud with self-questions while recording key information on the graphic organizer. Students simultaneously record on their own graphic organizers. Then, while reading a few more paragraphs, invite the class to suggest what the teacher should record. As support, have students stop at teacher indicated *pause points*. Consider having partners brainstorm first prior to

making a class decision about what to record. Lastly, students finish the reading task independently, while the teacher provides encouragement and support to individual students.

4. **Conduct post-reading activities.** A general content literacy strategy that helps students understand better and remember longer is paraphrasing and summarizing what they have read. Teachers can correct any misconceptions by reviewing student summarizes. Additionally, completed graphic organizers can serve as a check for understanding.

Literacy Skills for Learning in English/Language Arts

A middle school English teacher developed a class project to explore several text structures typically found in expository passages. First, she defines each structure under study and shows example passages with accompanying knowledge maps. Then, she organizes her students into small groups. Each group receives a unique short passage with one particular text structure. Students identify the structure and draw an original graphic organizer to display the knowledge presented in the text. Finally, groups present an analysis of the text to their peers by describing the relationships among the concepts in the text using their graphic organizer.

Writing

The purpose of writing is to communicate knowledge, insights, and more to others. Writing in varied forms is necessary in all content areas. A fusion of reading, discussion, and writing has many benefits: increased reading comprehension, critical thinking, and mastery of content knowledge (Bulgren, Marquis, et al., 2009; Graham & Herbert, 2011). In a study of six middle schools from two districts serving diverse leaners, more than 1500 assignments from 92 English, science, and social studies classrooms were analyzed. Their findings showed that eighty-five percent of assignments required students to recall information or apply basic skills, and only four percent prompted students to think critically (Santelises & Dabrowski, 2015). Beyond the use of writing to express understanding of factual information, there is a need for writing with analytic and interpretative purposes (Johnson, 2016).

Teacher Decisions about Writing Tasks

When teachers incorporate writing tasks regularly, they create a learning community that values writing as well as implement the top recommendation for improving writing performance—dedicate time to writing (Graham & Harris, 2016). Writing assignments do not have to be lengthy; the paragraph is suggested as a common denominator across genres and disciplines (Johnson, 2016). The subsequent suggestions help teachers create writing assignments in response to reading and to express content learning, not solely to recall facts, but also to realize new relationships among discipline-specific concepts.

Identify purpose for writing. Check cognitive expectations in the unit or lesson of study as represented in the standards for learning (i.e., notice the verbs used to describe how students will learn the content). In addition, observe the text structure of reading assignments for ways students can also write as disciplinary experts. This is a specific way to connect writing to reading. When students also observe text structure, they can produce their own written products as an expert in that field would. More simply, they can use the structure to make note of key information needed for understanding and remembering to produce a summary. Finally, design essential questions for the unit or lesson to serve as writing prompts.

Select Scaffold(s). Scaffolds are instructional supports, usually temporary, that help students strengthen their understanding and skill acquisition. Consider varied student needs and offer choices of tools to support students' writing. For example, promote the use of a graphic organizer to gather information and organize ideas visually. Students may want to design their own graphic device or use a pre-existing organizer that matches the knowledge structure of their writing task. The Question Exploration Routine described in the content example at the end of this section is a flexible organizational tool that can be used as a guide for class discussion and help students write from a question prompt (Bulgren, Lenz, et al., 2001). Another scaffold is the sentence starter students can use to prompt student explanation of opposing ideas, such as *although* and *despite*.

Develop a writing rubric or editing checklist. Often, a writing rubric or editing checklist has been created already by the English department, and various teachers can tailor

them to match the expectations of any writing assignment. Writing related components to include are sentence variety, organization, content/ideas, vocabulary/word choice, and mechanics. Regardless of the specific rubric or checklists, or the length of the writing assignment, it is imperative to expect and reinforce student use of complete sentences. As with any assignment, students are more likely to submit high quality work when they know the criteria for success ahead of time.

Implementing Writing Tasks

Writing skill development takes time and patience. Emphasize growth by valuing errors because the process of becoming a proficient writer can be tremulous, even for students showing great potential from the outset. The subsequent routine can be followed while prompting writing tasks in any content area.

1. **Provide a purpose for writing.** State a clear purpose for writing by relating the task to learning goals in the unit or lesson. An example in math might be to compare and contrast quadrilaterals. If appropriate, pose an essential question for students to answer in their writing task. In addition, have students write goals for their own writing performance. For example, students may reflect on a past writing assignment and decide their next step in advancing their writing skills (e.g., I will combine some of my sentences into compound sentences; I will create a visual device to organize my ideas before writing).
2. **Introduce, model, and practice writing tools.** Two major tools that support writing are graphic organizers and rubrics or editing checklists. These tools are useful before, during, and after completing the writing task. Before students begin their own writing, teachers need to describe the purpose and parts of the graphic organizer best suited for the writing prompt. If students are to choose their own graphic organizer, be sure they are making an informed choice by modeling and practicing the use of multiple organizers prior to independent selection and use. Additionally, the rubric and/or editing checklist should be explained ahead of time and compared against an example, when appropriate. During

writing time, circulate through the classroom to provide encouragement, particularly in the use of the suggested tools as well as to question students, when needed, about their progress. Even if the writing task is only a paragraph, having a simple checklist available (i.e., taped to the desks, posted on the wall) helps reinforce students to generalize their writing in all content areas. A simple checklist with hints may include:

- Complete sentences? (capital letter, end punctuation, subject, verb, and complete thought)
- Organization of ideas? (topic sentence, detail sentences, and concluding sentence)
- Responded to prompt? (on topic, examples and key vocabulary included, level of thinking required by prompt is shown)

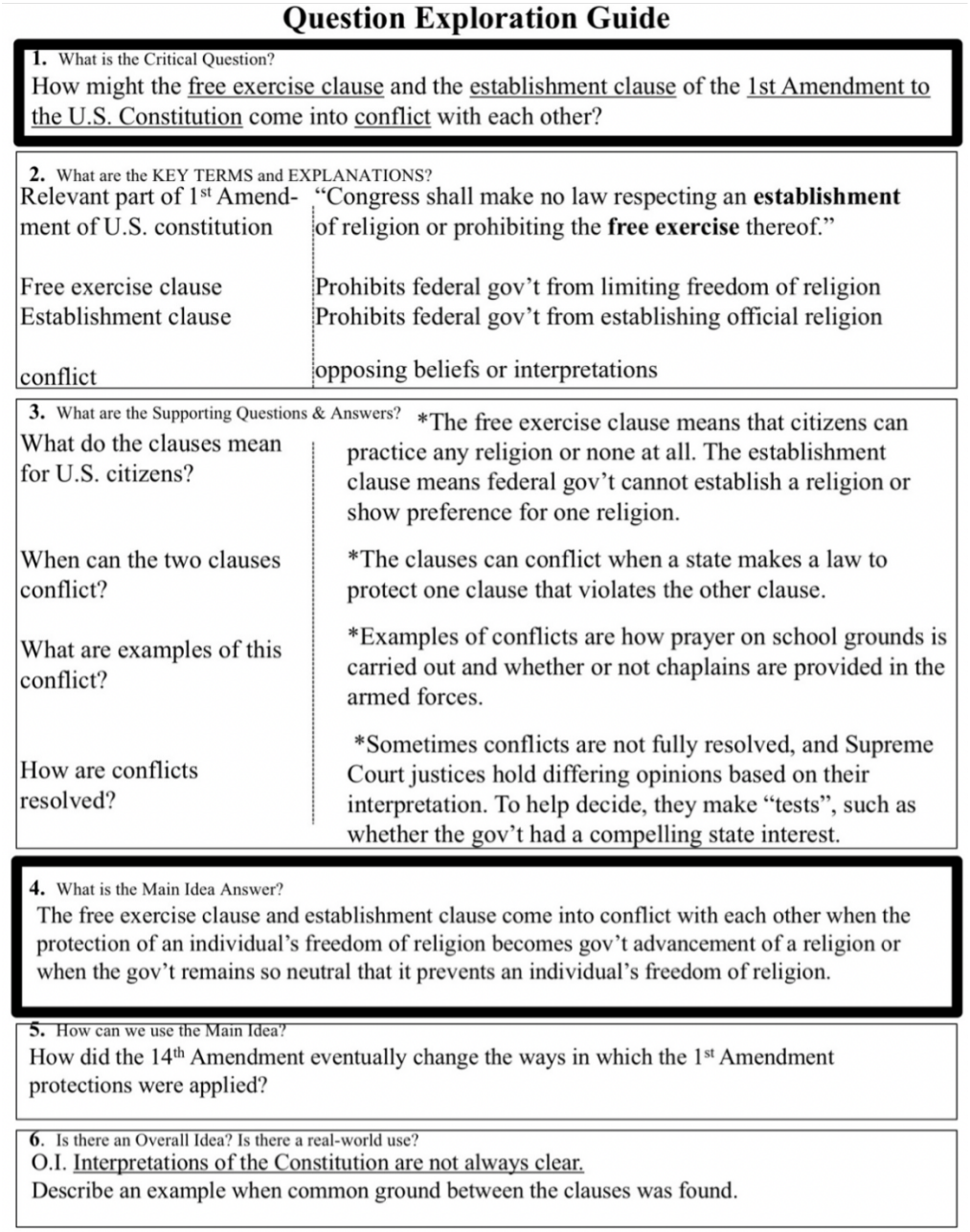
Afford time for timely feedback. Using the rubric or editing checklist provided in advance, have students work with a partner to provide feedback. Perhaps, have students identify 1-2 areas on the rubric as a focus for feedback. Some teachers have students complete the rubric or editing checklist to submit with their final product.

Once their written product is submitted, teachers record feedback on the same rubric or editing checklist. Feedback should be descriptive rather than solely a form of praise. Also, teachers should not correct every error. Rather, categorize errors and provide varied levels of feedback based on the learner's needs. As an illustration, for some students, a symbol written at the end of a line of text that alerts attention to a type of error will be enough to challenge them to resolve the error, whereas other students may require more direction through a line under an error, followed by a brief conference to see a demonstration of a similar sentence prior to correcting his or her own error (Chappuis, 2012). During feedback conferencing, always provide positive, task-oriented feedback first, followed by constructive feedback that is growth producing.

Literacy Skills for Learning in Social Studies

Initially, as an effort to support the writing goals of his colleagues teaching English, a civics teacher dedicated instructional time for students to write in response to critical questions.

During each unit, he and the whole class of students first co-construct the Question Exploration Guide (Bulgren, Lenz, et al., 2001) in response to a vital unit question. An example of the outcome of their activity is provided in Figure 1, and more information about this instructional tool is provided in the Footnote[1].



Question Exploration Guide

1. What is the Critical Question?

How might the free exercise clause and the establishment clause of the 1st Amendment to the U.S. Constitution come into conflict with each other?

2. What are the KEY TERMS and EXPLANATIONS?

Relevant part of 1st Amendment of U.S. constitution	"Congress shall make no law respecting an **establishment** of religion or prohibiting the **free exercise** thereof."
Free exercise clause	Prohibits federal gov't from limiting freedom of religion
Establishment clause	Prohibits federal gov't from establishing official religion
conflict	opposing beliefs or interpretations

3. What are the Supporting Questions & Answers?

What do the clauses mean for U.S. citizens?	*The free exercise clause means that citizens can practice any religion or none at all. The establishment clause means federal gov't cannot establish a religion or show preference for one religion.
When can the two clauses conflict?	*The clauses can conflict when a state makes a law to protect one clause that violates the other clause.
What are examples of this conflict?	*Examples of conflicts are how prayer on school grounds is carried out and whether or not chaplains are provided in the armed forces.
How are conflicts resolved?	*Sometimes conflicts are not fully resolved, and Supreme Court justices hold differing opinions based on their interpretation. To help decide, they make "tests", such as whether the gov't had a compelling state interest.

4. What is the Main Idea Answer?

The free exercise clause and establishment clause come into conflict with each other when the protection of an individual's freedom of religion becomes gov't advancement of a religion or when the gov't remains so neutral that it prevents an individual's freedom of religion.

5. How can we use the Main Idea?

How did the 14th Amendment eventually change the ways in which the 1st Amendment protections were applied?

6. Is there an Overall Idea? Is there a real-world use?

O.I. Interpretations of the Constitution are not always clear.

Describe an example when common ground between the clauses was found.

Figure 1. Question Exploration Routine in Civics (2001 by Bulgren, Lenz, Deshler, & Schumaker. Reprinted with permission from the copyright holders).

[1] The Question Exploration Guide shown in Figure 1 is an instructional tool developed and researched at the University of Kansas Center for Research on Learning. It is one of a number of teaching devices designed for teachers to use as they teach content information to classes containing diverse student populations. It is a data- based teaching instrument that has been found effective when used with a planning routine as well as a teaching routine that combines cues about the instruction, specialized delivery of the content, involvement of the students in the cognitive processes, and a review of the learning process and content material. It has not been shown to be an effective tool if it is simply distributed to students. The *Question Exploration Routine* is available through professional development led by certified SIMTM Professional Developers.

The *Question Exploration Routine* is one Content Enhancement Routine that has been shown evidence to support an improvement in writing performance because the visual device follows a clear written response pattern (Bulgren, Marquis, et al., 2009). In this civics class, students write an essay using this guide to organize their paragraphs. The question and key terms sections support the development of the introductory paragraph, including a thesis statement. The body of the essay is developed using the supporting questions and answers section. The body of the essay consists of three or more paragraphs depending on the extent of the information asked in the supporting questions and answers in the same section. The main idea answer is used to develop the final paragraph. The final paragraph may also include additional discussions based on the overall idea and real-world sections. Later, students evaluate their essay using a corresponding writing checklist from their English class. After witnessing his students' increased performance on classroom and standardized tests of content knowledge through multiple choice and short answer formats, this civics teacher became a strong advocate for writing in his discipline because he found that if students could write about their conceptual understanding, then expression of their underlying knowledge became second nature.

Vocabulary

For adolescents, vocabulary knowledge has a strong relationship to reading comprehension and academic success (Dennis, 2012; Eason, et al., 2013; Paige, et al., 2014). Vocabulary knowledge is defined as making meaning from written or oral text and can be received or expressed by individuals. Background knowledge and experiences play a role in building one's vocabulary, which in turn, influence the ability to comprehend text and verbal presentations of information (i.e., lectures). A common method for introducing new vocabulary is to instruct students to copy the definition (Wanzek & Vaughn, 2016). Not only does this

method teach solely one word at a time, but it also relies too heavily on a student's memory. Teachers need to provide explicit instruction by dedicating class time regularly and offering multiple opportunities for making meaning through the manipulation of words (Kamil, et al., 2008).

Selection of Vocabulary Words

In order to devote sufficient time, selection of words for vocabulary development is key. There are many ways to identify words for emphasis. Some words require brief explanation while other words require explicit instruction. Brief explanation could include providing a definition or teaching how to locate the meaning of the word in the margin or glossary of a text. The following recommendations guide the planning process in selection of words for explicit instruction.

Prior knowledge. For the upcoming lesson or unit, relevant concepts taught in previous lessons, units, or courses are considered as possible words of focus. In addition, teachers can pre-assess students to help narrow the vocabulary emphasis. Finally, words that are typically difficult from past years of instruction can influence a teacher's decision on words to teach in depth.

Foundational to new learning. There are some words that act as gatekeepers to understanding the concepts in the lesson or unit. For example, a student will not fully understand the Declaration of Independence without knowing the meaning of *inalienable* rights.

Expression of understanding. Use of certain words allow students to demonstrate their understanding of conceptual relationships. Most adolescents are developmentally ready to think about their thinking, known as meta-cognition (Weil, et al., 2013). Teachers of all disciplines can foster this type of awareness in their learning process. Words such as cause/effect, compare/contrast, and analysis, are often used by teachers in reference to Bloom's Taxonomy; however, in action, these non-specialized academic words strengthen students' ability to express their understanding and appreciate their learning. A place to locate words for emphasis is by reviewing the text structure of reading materials.

Tiers of words. One way to sort through many potential vocabulary words is by considering the varied purposes the words serve. Beck and colleagues (2002) organize words into three tiers based on a word's frequency of use, complexity, and meaning.

1. Tier 1 includes basic words that are a part of everyday life (i.e., house, fruit, bus) that do not usually require instruction.
2. Tier 2 words occur with high frequency across content areas and may contain multiple meanings. For example, the word *draft* can function as a noun or a verb in many contexts. In English class, *draft* represents part of the writing process; in social studies, *draft* means citizens must participate in the military; and in science, *draft* refers to a current of air moving into an enclosed space. When teachers are alert to these dual meanings, they can acknowledge and explain them to students, preventing confusion.
3. Tier 3 refers to words that are specific to a discipline and occur with low frequency, such as oligopoly, convex, and solubility.

Multisyllabic Words. Multisyllabic words have more than one syllable. They typically have Latin or Greek origins and can be broken into word parts with meaning, called morphemes (i.e., prefix, root, and suffix). Secondary English curricula includes teaching the meaning of common word parts, and specialized, academic words used in the math and science disciplines are typically made of two ore more morphemes. These are words that will be new to many students' receptive or expressive vocabularies.

Teaching Vocabulary with Explicitness and Elaboration

Teachers need to remember the importance of giving students opportunities to understand the meaning of words and to manipulate words in context. Don Deshler, a renowned expert on the learning process, once coined a mnemonic device—*3Ms of Learning: Memory, Manipulation, and Meaning*—to emphasize that the more a word is manipulated, the more its meaning becomes clearer, and the less memory is taxed (personal communication, February 1, 2017). The subsequent steps are for teaching vocabulary deemed appropriate for elaborate and explicit instruction.

1. **Begin with pronunciation.** There are specific vocabulary words used to communicate about concepts with precision in all content areas. Students need to hear how words sound to build their familiarity with the word during verbal exchanges and during independent reading, especially for students who struggle with reading at the word level (i.e., phonemic awareness, phonics, and decoding). Also, students need to practice correct pronunciation of words which will give them confidence in communicating their ideas. See other section in the chapter on the importance of speaking and listening.
2. **Provide context.** When new vocabulary is introduced, teachers need to provide a sentence that shows the word's meaning. Teachers should seek opportunities to group words for increased conceptual understanding (Baxter & Reddy, 2007). Vocabulary words in social studies, in particular, express more than just the meaning of the word itself, but also the ideology that the word represents (e.g., conservative and liberal).
3. **Interact with the word.** Have students paraphrase the meaning or interact with the definition by highlighting key terms. Use graphic organizers to help students break down the meaning of the word, record examples and non-examples, and develop a memory tool for each word. The importance of manipulation with new words cannot be emphasized enough in order for learning to move into long-term memory and allow for higher level connects to be made.
4. **Analyze and extend morphemes (when applicable).** When vocabulary words are multisyllabic and contain morphemes (i.e., word parts with meaning), students can identify the meaning of the prefix, root, and suffix in order to predict the meaning of new words. This method is known as generative vocabulary development and allows students to learn the meaning of new words beyond the current vocabulary word of focus (Harris, Schumaker, & Deshler, 2011). For example, if a math teacher were to point out how the root of *equation* is *equi*, meaning same or equal, then when students encounter the word *equity* in their social studies class, they could infer the

meaning with additional knowledge of the suffix *–ty* to be *state of being the same*. With this type of morphological analysis, students can determine the approximate meaning of other words based on their morphemes and context clues, bringing this generative vocabulary approach to fruition.

There are teaching techniques available to guide teachers and students through an elaborate, explicit instructional process with generative vocabulary development. Two examples are *The Word Mapping Strategy* (Harris, Schumaker, & Deshler, 2008) and *The 7-Step Vocabulary Process* (Brasseur-Hock, Hock, & Deshler, 2012) developed as part of the Fusion Reading Program. The latter example is shown in Figure 2 below. In addition, the website www.membean.com is a resource that provides interactive word part trees with numerous examples of additional multisyllabic words expanding from the initial word.

1. Write the word.
2. Pronounce the word.
3. Look for clues to the word's meaning.
    - Check the context.
    - Check the prefix, suffix, and root
4. Guess what the word means.
5. Discuss and identify a common definition.
6. Identify other words with the same prefix, suffix, or root.
7. Write two example sentences.
    - One with the vocabulary word.
    - One with a common prefix, suffix, or root word.

Figure 2. The 7-Step Vocabulary Process (2012 by Brasseur-Hock, Hock, & Deshler. Reprinted with permission from the copyright holders).

Literacy Skills for Learning in Science

A high school science department collaboratively decides to use a similar process for morphological analysis across all courses. They coordinate their efforts with the English teachers to provide all students with color-coded lists of the most frequently occurring prefixes, roots, and

suffixes, broadly in the English language, and specifically in science learning. The English department has taught students a method for analyzing word parts, and the science teachers prompt students to apply this method in their courses when vocabulary is pre-taught as well as when new words are encountered while reading their text or laboratory instructions.

Speaking and Listening

Class discussions and co-constructed learning are two ways to foster increased speaking and listening among students. Both instructional methods involve taking a partnership approach to teaching and learning. Partnership learning is a mindset and a method grounded in the belief that all individuals learn best when they come together as partners (Knight, 2007). Leading a class discussion, with partnership learning at its core, means creating balance and equal voices student-to-student and teacher-to-students as well as encouraging interactive dialogue. Co-constructed learning is a student-centered collaborative process that involves students exploring new learning and making decisions about critical concepts and their relationships under teacher guidance (Ben-Hanania Lenz, 2015). Figure 3 provides a visual aid for how these terms relate. In some classrooms, speaking opportunities are limited, and when made available through class discussions, their structure is oriented toward seeking opinions rather than evidence (e.g., What did you think of the text?). Also, class discussions more often occur in advanced rather than general courses (Applebee, et al., 2003). In addition, many class discussions take place in small groups without explicit goals for their discussion. However, researchers have found that discussions anchored in text evidence have the highest effect for average and struggling readers (Kamil, et al., 2008; Torgeson et al., 2007). Thus, text- based and evidence-driven class discussions and co-constructed learning are concrete ways for students to synthesize content and gain access to the meaning of text.

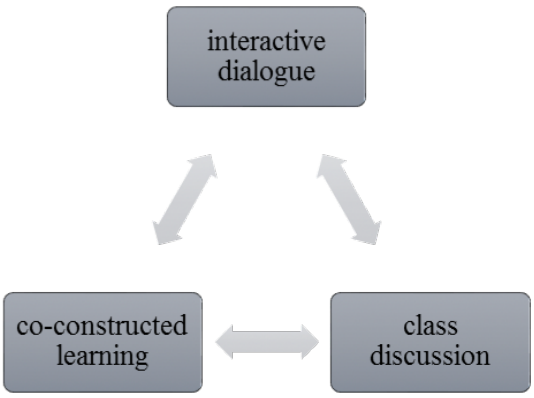


Figure 3. Relationship of teaching strategies for speaking and listening.

Preparing for Class Discussions and Co-Constructed Learning

Facilitating interactive dialogue among students requires thoughtful planning. The following considerations guide the planning process for leading class discussions and co-constructed learning as a means for increasing discipline-specific communication.

Build the classroom learning environment. For some students, participating in whole class or small group dialogue will be a challenging or new experience. Take steps to create a safe and supportive environment that welcomes risk-taking, questioning, and sharing by establishing classroom community principles founded in a partnership learning approach. In addition, when class discussion and co-constructed learning take place on a routine basis, students will feel more comfortable with the process and expectations for participation.

Identify students or classes that require scaffolds for successful participation. Co-constructed learning is high quality when *all students* participate in an interactive dialogue of targeted information, typically from text, defend their positions prior to recording key information on a visual device, graphic organizer, or note-taking tool (Ben-Hanania Lenz, 2015). Students who typically volunteer answers to questions, pose questions, or share insights will continue to grow; for those who are not engaging in class discussions, the achievement gap widens as they miss opportunities to increase their abilities (Wiliam, 2011). Many students will require scaffolds to make participation more achievable. For example, students with speech-

language or processing impairments may require more time to express themselves. Reserved students will appreciate support as well. Implementing and modeling the following techniques help diverse learners.

- sentence starters (e.g., I disagree because...)
- rehearsal or role playing with a peer or adult
- Think-Pair-Share (Lyman, 1981)
- highlighting key ideas in the text or discussion question
- writing before speaking all student response techniques, such as randomized calling on students (Wiliam, 2011)

Select text(s). While not all text selection can have the following qualities, for use in class discussions or in co-constructing graphic organizers, attempt to locate text that is 1) engaging to adolescents, 2) likely to spark rich discussion, 3) relevant and essential to the discipline and its standards for learning, and 4) contains multiple viewpoints and claims. Also, select text that is near the reading ability level for students.

Determine protocol. Develop or locate a process for class discussion or co- constructed learning that will foster interactive dialogue and use of evidence to support claims and main ideas.

The efferent discussion is the most effective discussion type, in comparison with protocols that ask for student opinion based on personal experiences or knowledge (Kamil, et al., 2008). Efferent discussions use text-based questions, such as:

- What is the author saying in this sentence?
- Which statement best supports the author's viewpoint?
- Does this statement agree with information in another text?

Several evidence-based options for co-constructed learning are available as part of the Strategic Instruction Model (SIM™) Content Enhancement Routine series. These instructional methods actively engage students with content by providing steps for the class to make decisions

about critical content in partnership with students (Ben-Hanania Lenz, 2015). Content Enhancement Routines meet a variety of teaching and learning needs, such as:

- Planning, organizing, and leading learning with critical course, unit, and lesson content
- Exploring text, topics, and details
- Visually representing critical and complex concepts to develop deep understanding and shared vocabulary
- Unpacking critical questions by defining key vocabulary, developing supporting questions, and relating to bigger ideas in and out of the course
- Analyzing cause and effect relationships and evidence for scientific claims

  More information can be found on the University of Kansas Center for Research on Learning's website at www.kucrl.org.

Draft open-ended, directed questions. Regardless of your protocol, prepare for an initial broad question and follow-up questions. Questions should require deep thinking and foster making connections (e.g., In what ways is life on land more difficult than life in water?). Follow-up questions will extend the discussion and reinforce interactive dialogue among classmates (e.g., How did you come to that conclusion? Why might you disagree with your partner's statement?). Tailor questions to be discipline-specific or to guide the development of a graphic organizer.

Leading Class Discussions and Co-Constructed Learning

Providing time for students to verbalize their understanding can serve as a component of formative assessment, an instructional cycle that begins with a check for understanding, followed by an adjustment in instruction and feedback to students, and is known to have a strong impact on learning (Wiliam, 2011).

1. **Provide an advance organizer.** Connect the benefits of the upcoming exercise to the goals of learning. State behavioral expectations for active participation, such as sharing your perspective and recording key information.

2. **Model through think aloud and physical actions.** As part of explicit instruction, teachers provide a model of how to explain, provide reasoning, and counterarguments when providing evidence for their assertions. Additionally, the selected protocol may require a demonstration of a participation tool or other support that is encouraged.
3. **Give processing time.** Assign the reading with the task to highlight or annotate text in the margin or with post-it notes. Have students write before beginning the class discussion, which allows for processing time.
4. **Implement the class discussion or co-constructed learning protocol.** With efferent discussion, text must remain the main authority in the discussion, so the teacher remains neutral and facilitates students back to the text or protocol through open-ended, directed questions. When co-constructing graphic organizers, teachers use questioning to guide student responses and decision-making process to determine and organize critical content, while simultaneously evaluating student understanding in order to clear up any misunderstandings.
5. **Review content and process.** Ask students to summarize key conclusions drawn from the text or recorded on their graphic organizer. Additionally, draw students' attention to aspects of the learning process that helped them see new relationships within their content learning (e.g., Where on the graphic organizer do we find evidence to support our main idea?).

Literacy Skills for Learning in Math

In a co-taught math class, a general education teacher and a special education teacher use Accountable Talk Stems, shown in Figure 4, to increase student use of respectful talk, rich with academic language. Accountable Talk Stems are sentence starters that ensure students express their ideas in complete statements while holding themselves and each other accountable for discussion based on evidence by actively listening, challenging respectfully, and building on classmates' ideas (Michaels, et al., 2010). As a routine, when a class discussion begins, all

students reach for their Accountable Talk Stem bookmark in the center of their table or within their binder.

Remember to…	**Sounds like…**
Ask questions.	Will you tell me more? Would you say that again? Will you give me an example?
Give reasons.	This reminds me of ____ because ____. I believe this is true because ____. I agree or disagree with that because _____.
Ask for evidence.	I'm not sure that's right. Can you tell me why you think it's true? Can you show me a place in the book that illustrates that idea?
Give evidence.	Read a statement from a text that illustrates your idea. Bring another information source to support your idea.
Connect with others.	I agree with _____ because _____. I want to add on to what _____ said about _____.

Figure 4. Accountable Talk Stems Bookmark adapted from Michaels et al., 2010

Another Condition Impacting Adolescent Literacy Skills

Motivation for learning during adolescence can be challenging. The most effective and respectful way to increase motivation among this age group is to foster intrinsic motivation through these teacher behaviors: 1) provide rationales for learning in reference to the unit, course, or real world, 2) select relevant and engaging material, 3) co-construct authentic, personally meaningful learning goals, 4) provide voice and choice in assignments, 5) provide opportunities for collaboration, 6) offer timely, task-specific and descriptive feedback, and 7) chart academic progress (Kamil et al., 2008). In addition, place-based strategies, such as incorporating references to common local practices (i.e., fishery, basketball, music), may improve students' view of the curriculum as applicable to their life (Azano, 2011). Finally, the use of technology in all forms of literacy development makes learning not only more efficient, but also more motivating and relevant.

Table 2. *Key Teaching Behaviors to Nurture Literacy Skills for Content Learning*

Literacy Skill	Planning Considerations	Teaching Behaviors	Further Professional Learning
Reading	• Reading levels • Text structure and purpose • Concepts and vocabulary demands	• Pre-teach concepts and vocabulary • Use graphic organizers • Model self-questioning	Disciplinary Literacy - Timothy and Cynthia Shannahan http://www.shanahanonliteracy.com Making Sense Strategies and Graphic Organizers - Ed Ellis https://makessensestrategies.com
Writing	• Scaffolds needed • Critical course questions • Consistent writing techniques in the school	• Assign writing in response to reading and to express learning • Provide and promote organization tools • Use rubrics and editing checklists for feedback	*Writing to Read* - Steven Graham https://www.carnegie.org/media/filer_public/9d/e2/9de20604-a055-42da-bc00-77da949b29d7/ccny_report_2010_writing.pdf Question Exploration Routine - Jan Bulgren (first author) http://www.edgeenterprisesinc.com
Vocabulary	• Selection of words • Prior knowledge	• Foster manipulation of words • Use generative vocabulary development strategies	Tiered Words - Isabel Beck https://www.superduperinc.com/handouts/pdf/182_VocabularyTiers.pdf The Word Mapping Strategy -Monica Harris (first author) http://sim.kucrl.org/products/details/word-mapping-strategy 7-Step Vocabulary Process – Irma Brasseur-Hock (first author) https://www.fusionreadingandlearning.com
Speaking & Listening	• Speech-language or processing impairments • Protocols to facilitate dialogue	• Foster Active Participation • Co-construct learning • Efferent Discussion	Efferent Discussion – Michael Kamil http://www.definingthecore.com/downloads/Text-Based_Discussion.pdf *Embedded Formative Assessment* book– Dylan Wiliam http://www.dylanwiliam.org SIM™ Content Enhancement Series - Keith Lenz, editor http://sim.kucrl.org/routines

Conclusion

To conclude, when students leave school, it is the *how* of learning that matters most, as in their ability to learn difficult content. When planning for instruction, teachers need to view content learning through two lenses: the disciplinary expert and the novice learner. The integration of reading, discussion, and writing has significant positive effects for increasing reading comprehension, developing critical thinking skills, and mastering content knowledge (Bulgren, Marquis, et al., 2009; Graham & Herbert, 2011). Furthermore, vocabulary knowledge is a precursor to all literacy skill development. Table 2 provides a summary of key teaching behaviors to nurture literacy skills for content learning. While some adolescents continue to require basic or strategic reading skill instruction, all students need instruction and support to acquire and to apply the unique literacy strategies relevant to each content area.

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