Spring 4-2018

A Study of the Effect of Actively Learn on Secondary Reading Engagement, Reading Comprehension, and Vocabulary

Tina Rae Spencer
Lindenwood University

A Study of the Effect of Actively Learn on Secondary Reading Engagement, Reading Comprehension, and Vocabulary

by

Tina Rae Spencer

April 2018

A Dissertation submitted to the Education Faculty of Lindenwood University in partial fulfillment of the requirements for the degree of

Doctor of Education

School of Education

A Study of the Effect of Actively Learn on Secondary

Reading Engagement, Reading Comprehension,

and Vocabulary

by

Tina Rae Spencer

This Dissertation has been approved as partial fulfillment

of the requirements for the degree of

Doctor of Education

Lindenwood University, School of Education

Julie Williams — Dr. Julie Williams, Dissertation Chair — 4/2/2018 — Date

Terry Reid — Dr. Terry Reid, Committee Member — 4/2/2018 — Date

Kathy J Grover — Dr. Kathy Grover, Committee Member — 4-2-2018 — Date

Declaration of Originality

I do hereby declare and attest to the fact that this is an original study based solely upon my own scholarly work at Lindenwood University and that I have not submitted it for any other college or university course or degree.

Full Legal Name: Tina Rae Spencer

Signature: Tina Rae Spencer Date: 4/2/2018

Acknowledgements

I would like to thank the instructors and staff of Lindenwood University who have made the experience of attaining my doctorate one of true growth as an educator and a leader, particularly my committee members. Dr. Terry Reid took care of the program details from day one; Dr. Kathy Grover was there from proposal to defense; and Dr. Julie Williams's endless encouragement and sacrifice of hours of her time outside of class will never be forgotten. Dr. Williams's rigorous expectations pushed me to do better work than I ever thought I was capable of achieving.

I owe a debt of gratitude to my friends and family for all their support and encouragement. My parents, Michael and Charlotte Spencer, and my friends, Doug and Nancy Cooper, gave me the peace of mind of knowing my child was being cared for so that I could concentrate on classwork and writing. I also owe a thank you to Dr. Tina Woolsey, my friend and mentor, who provided a listening ear, words of wisdom, and access to her extensive personal library for research during this process. I could not have completed this degree without the love, support, and encouragement of so many people, and words cannot express how much I appreciate all of them.

Abstract

The purpose of this study was to determine if the use of the reading platform Actively Learn affected the reading engagement, reading comprehension, and vocabulary achievement of secondary students. The area of secondary reading achievement has seen no significant improvement over the past four decades (National Center for Educational Statistics, 2017). The research questions were designed to use quantitative pre-test and post-test data from the Metacognitive Awareness of Reading Strategies Inventory (MARSI) and the Standardized Test for the Assessment of Reading (STAR) to determine if the use of Actively Learn, combined with the use of embedded questions to encourage metacognitive strategies and timely feedback from the instructor, affected secondary reading engagement and achievement. The data demonstrated a statistically significant improvement in student perceptions of reading engagement strategies on the MARSI from pre-test to post-test after application of Actively Learn. However, data from the STAR reflected no significant difference in student achievement in the areas of reading comprehension or vocabulary after using Actively Learn.

Table of Contents

List of Tables

Chapter One: Introduction

According to Anderson (1985), "Reading is a basic life skill. It is a cornerstone for a child's success in school and, indeed, throughout life. Without the ability to read well, opportunities for personal fulfillment and job success inevitably will be lost" (p. 1). Few educators in any content area would argue with this statement. The importance of the effective teaching of reading skills is reflected in the sheer number of studies on every facet of the topic. Current research informs educators like never before on best practices for teaching literacy skills, and increasing access to technology gives students and teachers tools that were unimaginable in prior generations (National Center for Educational Statistics, 2017). However, fewer than half of high school graduates in the United States leave their secondary education with the ability to comprehend complex texts (National Center for Educational Statistics, 2017).

Rennie (2016) maintained the emphasis on *reading to learn* as opposed to *learning to read* exacerbates the problem, as support for those who continue to need support in the learning to read category rarely find it. Inflexible secondary school structures and timetables, as well as the focus of secondary teachers on disciplinary fields, not literacy, also contribute to this problem (Rennie, 2016). Studies on improving reading achievement at the secondary level must continue in order to remedy this impediment to success in the world after high school.

This study was designed to investigate the impact of metacognitive awareness, teacher feedback, and the use of the reading platform Actively Learn on secondary reading engagement, comprehension, and vocabulary skills. Fisher, Frey, and Hattie (2016) included metacognition and feedback as teaching strategies with high effect sizes,

and Actively Learn allows teachers to monitor reading comprehension and engagement in real time (Actively Learn, 2017). Students provided pre-test and post-test self-assessment of reading engagement skills using the Metacognitive Awareness of Reading Strategies Inventory (MARSI). Reading comprehension and vocabulary skills were measured through pre-tests and post-tests using the Standardized Test for the Assessment of Reading (STAR). Actively Learn was administered as a teaching tool in the interim. The focus of this study was to determine if the use of Actively Learn impacted secondary reading scores, an area which has shown no significant progress nationwide during the last four decades (National Center for Educational Statistics, 2017).

In Chapter One, background information for the study includes the need for additional research in the area of secondary reading achievement, as well as support for the teaching methods employed in the study. The conceptual framework provides support for the significance of this study and is followed by a statement of the problem, which served as the impetus to this research. Research questions and hypotheses are posed, limitations and assumptions stated, and key terms pertinent to understanding the research are defined.

Background of the Study

Both national and international assessments over the span of the last four decades have revealed stagnant performance in reading achievement for adolescents in high school and after graduation (Goldman, Snow, & Vaughn, 2016; National Center for Educational Statistics, 2017). However, reading researchers historically had a tendency to focus on the teaching and acquisition of reading skills in the primary and middle school grades, leaving secondary practitioners with a scarcity of resources for improving

achievement in literacy skills (Duncan, McGeown, Griffiths, Stothard, & Dobai, 2016). Reading skills exist on a continuum, and the teaching of foundational skills, while imperative to building more complex skills, differs from teaching while assuming mastery of foundational skills at the secondary level (Paris, 2005). The need for additional study in the secondary environment has been made apparent through longitudinal studies revealing lack of significant growth in adolescent reading skills over the past four decades (Goldman et al., 2016; National Center for Educational Statistics, 2017).

One long-standing impediment to improvement in reading achievement at the secondary level is the perception of secondary teachers that they are disciplinary teachers, and the purview of teaching reading skills falls outside their area of expertise (Rennie, 2016). As a result, support for secondary students in the area of literacy has historically been directed through remedial support for those who demonstrate deficits, not aligned to mainstream classroom pedagogy (Rennie, 2016). However, current writing in the area of embedding text interaction in disciplinary classes outside of reading and language arts courses focuses on the importance of the explicit teaching of reading skills as imperative to moving beyond surface learning to deep acquisition of information, the goal of all educators regardless of subject area (Fisher et al., 2016).

The use of metacognitive strategies and teacher feedback are central to improving literacy skills necessary for deep learning (Fisher et al., 2016). Metacognitive awareness, or the ability of a person to observe his or her own thinking, must be taught, and involves more than just an awareness of thoughts; it includes teaching students to plan tasks, monitor comprehension, and evaluate progress (Fisher et al., 2016). Afflerbach (2014)

maintained self-assessment, a form of metacognition, is a major contributor to reading development and has significant benefits.

Teaching students to use metacognitive reading strategies to the point the strategies are automatic gives students a sense of self-control and contributes to reading achievement (Afflerbach, 2014). These metacognitive skills, including setting the stage for the reading act, using strategies to problem-solve when understanding difficult texts, and supporting sustained responses to reading, are strengthened by timely, specific, understandable, and actionable feedback from the teacher; feedback on metacognitive strategies used can aid in deep consolidation of learning (Fisher et al., 2016; Mokhtari & Reichard, 2002).

The challenge for educators is making the internal process of thinking visible so that effective feedback is given (Ritchhart, Church, Morrison, & Perkins, 2011). However, advances in technology over the past three decades have provided educators with tools previously unimagined. One of these, the Actively Learn (2017) reading platform, combines digital text with the modeling, teaching, and student practice of metacognitive strategies while allowing for instantaneous feedback from the teacher. Actively Learn (2017) is unique because it allows questions to be embedded directly into the text, promotes student discussion of passages in the sidebar, and provides teachers the opportunity to view and respond to all student activities in real time. This study was designed to determine if the use of the Actively Learn platform led to improvements in the area of secondary reading achievement.

Conceptual Framework

Fisher et al. (2016), building on work by Paris (2005), provided the basis for the conceptual framework for this study. The development of reading skills requires intentional instruction throughout K-12 schooling of six skills labeled collectively as constrained and unconstrained (Paris, 2005). The finite skills of phonemic awareness, alphabetics, phonics, and fluency are acquired by the end of eighth grade (Fisher et al., 2016). This study was focused primarily on unconstrained skills, reading comprehension and vocabulary, which continue to develop throughout a person's lifetime and are essential for mature reading and transfer (Fisher et al., 2016). Stahl (2011) asserted these skills are never fully mastered due to the variability of text difficulty, genre, task, and instructional context. The unconstrained skills are more complex and time-consuming to teach and assess due to the difficulty in quantifying them (Stahl, 2011).

Mokhtari and Reichard (2002) stated skilled readers differ from unskilled readers in their ability to comprehend text at both literal and inferential levels. These researchers discovered critical aspects of skilled reading include awareness and monitoring of the comprehension process through metacognition (Mokhtari & Reichard, 2002). Fisher et al. (2016) described metacognitive awareness as "vital to the learning process, and specifically to reading and writing" (p. 92). Fisher et al. (2016) also found students' metacognitive skills are strengthened through feedback from the teacher. Hattie (2012) assigned an effect size of .73 (with .4 equal to one year of learning) to teacher feedback and stated, "Learning wrong information can be reduced when feedback is immediate" (p. 114). However, the type of feedback learners require must be based upon current skill

level, enabling the learner to "close the gap between current status and a more desirable level of achievement" (Hattie & Yates, 2014, pp. 65-66).

Two instruments were used to conduct this study. The Metacognitive Awareness of Reading Strategies Inventory (MARSI) was developed to assess students' metacognitive awareness of their reading strategies, with the intention of results used for "enhancing assessment, planning instruction, or conducting classroom or clinical research" (Mokhtari & Reichard, 2002, p. 255). The Standardized Test for the Assessment of Reading (STAR) is a nationally normed assessment that provides growth scores for five areas of reading development, including those measured for this study: Word Knowledge and Skills, and Comprehension Strategies and Constructing Meaning (Renaissance Learning, 2015).

The independent variable in this study was the use of Actively Learn. The online reading platform Actively Learn allows for the embedding of guided questioning and discussion directly into the text, as well as the ability of the instructor to see and respond to student responses, providing immediacy of feedback (Actively Learn, 2017). Whether use of the Actively Learn program had an effect on the reading engagement of students as measured by the MARSI, as well as the reading comprehension and vocabulary skills of these same students as measured by the STAR was examined.

Statement of the Problem

Although reading skills achievement has been intensively studied at the elementary level, studies concerning development of reading skills in adolescence are scarce and somewhat contradictory (Duncan et al., 2016). Paris (2005) attributed this to the fact constrained reading skills learned in early elementary school are less difficult to

assess than the unconstrained skills of reading comprehension and vocabulary. The need for additional understanding of reading skills development in high school students was reflected in a long-term assessment by the National Center for Educational Statistics (2017) of the results of the National Assessment of Educational Progress (NAEP). Data from the NAEP revealed that, while 9- and 13-year-olds made consistent gains in reading from 1971 through 2012, 17-year-olds, on average, demonstrated no statistically significant gains over the same period (National Center for Educational Statistics, 2017). A closer examination of these data demonstrated only 39% of 17-year-olds assessed in 2012 scored at a level allowing them to understand complicated information (National Center for Educational Statistics, 2017). Goldman et al. (2016) suggested this reflects a failure to provide students with literacy skills needed for learning in the content areas in the 21st century.

Paradoxically, teachers at the secondary level are the least-equipped to address this issue (Ness, 2016). Studies primarily focus on reading skills taught at the elementary level, because little in the way of direct reading instruction traditionally takes place at the secondary level, with the exception of attempts to remediate those with the lowest literacy skills (Rennie, 2016). However, Fisher and Frey (2015) cited examples supporting a global move toward the goal of helping students understand increasingly complex texts, including in the content areas. In the United States, implementation by many states of the Common Core State Standards incorporated desirable grade-level lexile ranges for both literature and informational texts that exceeded those previously being taught in many states (National Governors Association Center for Best Practices, Council of Chief State School Officers, 2010). Although this is not the only impetus, it

has contributed to the move toward educating secondary teachers about the need to explicitly teach reading skills to adolescents (Fisher & Frey, 2015).

The need for current studies of adolescent reading skills is compounded by the changing reading habits of this age group as they gain access to increasing amounts of digital technologies (Duncan et al., 2016). No longer can adolescent literacy experiences be measured primarily by exposure to traditional texts, although many students do not recognize their digital reading experiences, such as social networking and online searches, as literacy activities (Duncan et al., 2016). The relatively recent use of technological applications in the classroom contributes to the need for additional studies of how student achievement can be affected by these applications as they become available.

Purpose of the Study

The purpose of this project was to provide data on the effect of Actively Learn on student reading engagement, reading comprehension, and vocabulary for one Missouri school district's senior English students. Causal-comparative research was conducted to determine if Actively Learn impacted students' reading engagement, as measured by the MARSI, and reading comprehension and vocabulary, as measured by the STAR. In addition, insight on the effect of electronic texts with embedded comprehension and vocabulary questions that allow for instantaneous feedback from an instructor on students' perceived engagement and academic achievement in reading comprehension and vocabulary were provided.

Research questions and hypotheses. The following research questions and hypotheses guided the study:

1. What is the difference between perceptions of levels of reading engagement for high school seniors prior to using Actively Learn to interact with texts electronically versus their perceptions after using Actively Learn, as measured by the Metacognitive Awareness of Reading Strategies Inventory (MARSI)?

$H1_0$: There is no statistically significant difference between perceptions of levels of reading engagement for high school seniors prior to using Actively Learn to interact with texts electronically versus their perceptions after using Actively Learn, as measured by the Metacognitive Awareness of Reading Strategies Inventory (MARSI).

2. What is the difference in high school seniors' reading comprehension scores on the Standardized Test for the Assessment of Reading (STAR) after using Actively Learn to engage with texts as compared to their scores prior to using Actively Learn?

$H2_0$: There is no statistically significant difference in high school seniors' reading comprehension scores on the Standardized Test for the Assessment of Reading (STAR) after using Actively Learn to engage with texts as compared to their scores prior to using Actively Learn.

3. What is the difference in high school seniors' vocabulary scores on the Standardized Test for the Assessment of Reading (STAR) after using Actively Learn to engage with texts as compared to their scores prior to using Actively Learn?

$H3_0$: There is no statistically significant difference in high school seniors' vocabulary scores on the Standardized Test for the Assessment of Reading

(STAR) after using Actively Learn to engage with texts as compared to their scores prior to using Actively Learn.

4. What is the difference in the change in reading comprehension and vocabulary scores between the first and second administration of the Standardized Test for the Assessment of Reading (STAR) during their senior year for students in one Missouri school district during the 2017-2018 school year after using Actively Learn as compared to the change in scores between the first and second administration of the STAR for seniors during the 2013-2014, 2014-2015, 2015-2016, and 2016-2017 school years who did not use Actively Learn?

$H4_0$: There is no statistically significant difference in the change in reading comprehension and vocabulary scores between the first and second administration of the Standardized Test for the Assessment of Reading (STAR) during their senior year for students in one Missouri school district during the 2017-2018 school year after using Actively Learn as compared to the change in scores between the first and second administration of the STAR for seniors during the 2013-2014, 2014-2015, 2015-2016, and 2016-2017 school years who did not use Actively Learn.

Significance of the Study

The importance of literacy in today's society cannot be overstated (Fisher et al., 2016). Literacy is an antidote for poverty, gives people more choices in their work and personal lives, teaches people how to think successively, and is the impetus for other

learning (Fisher et al., 2016). Since the constrained reading skills of phonemic awareness, alphabetics, phonics, and fluency are finite, the first three skills are established by the end of third grade, and fluency is established by the end of eighth grade (Fisher et al., 2016).

The unconstrained reading skills, reading comprehension and vocabulary, are infinite and essential for mature reading and transfer (Fisher et al., 2016). Stahl (2011) noted reading comprehension and vocabulary are never fully mastered due to the variability of text difficulty, genre, task, and instructional context. Skilled readers differ from unskilled readers in their ability to comprehend text at both the literal and inferential levels (Mokhtari & Reichard, 2002). Awareness and monitoring of the comprehension process through metacognition are critical aspects of skilled reading (Mokhtari & Reichard, 2002).

Fisher et al. (2016) described metacognitive awareness as "vital to the learning process, and specifically to reading and writing" (p. 92). They also found students' metacognitive skills are strengthened through feedback from the teacher (Fisher et al., 2016). The online reading platform Actively Learn allows the instructor to embed questions and opportunities for discussion among readers directly into the text, providing the opportunity to assess understanding and provide immediate feedback when the student responds (Actively Learn, 2017). Since this is a relatively new and unique program, to date there are no published studies of the effect of the use of the platform on reading engagement, reading comprehension, or vocabulary. Using causal-comparative research, this researcher determined if using Actively Learn has an effect on students'

perceived reading engagement using the MARSI, and on reading comprehension and vocabulary scores using the STAR.

Definition of Key Terms

For the purposes of this study, the following terms are defined:

Actively Learn. Actively Learn (2017) is an online reading platform that allows teachers to embed questions in texts and to give immediate feedback to students as they submit their answers.

Alphabetics. Alphabetics are the symbols of a language (Fisher et al., 2016).

Constrained skills. Constrained skills are reading skills learned quickly that can be entirely mastered: alphabetics, phonemic awareness, phonics, and fluency (Paris, 2005).

Effect size. Effect size is the relative impact, quantitatively, of the impact of an intervention (Hattie, 2012). An effect size of .4 is considered typical for one year of learning (Hattie, 2012).

Embedded assessment. Embedded assessment includes questions and discussion opportunities inserted into the body of an existing text by an instructor with the goal of assessing student understanding of the text (Actively Learn, 2017).

Feedback. Feedback is communication between the instructor and student, providing cues to assist the student to succeed in the task (Hattie, 2012).

Fluency. Fluency is the ability to automatically decode running text (Fisher et al., 2016).

Global reading strategies. Global reading strategies are a set of reading strategies oriented toward a global analysis of text (Mokhtari & Reichard, 2002). These

strategies are generalized, intentional reading strategies aimed at setting the purpose of the reading and making predictions (Mokhtari & Reichard, 2002).

Metacognition. Metacognition is the ability to think about and reflect on one's learning and is also known as executive function (Fisher et al., 2016).

Metacognitive Awareness of Reading Strategies Inventory (MARSI). The MARSI is a self-report instrument designed to assist readers' metacognitive awareness and perceived use of reading strategies while reading academic or school-related materials (Mokhtari & Reichard, 2002).

Phonemic awareness. Phonemic awareness includes mindfulness of the sounds of a language (Fisher et al., 2016).

Phonics. Phonics is the ability to connect the sounds of a language to its symbols (Fisher et al., 2016).

Problem-solving strategies. Problem-solving strategies are employed by the reader when problems develop in understanding textual information (Mokhtari & Reichard, 2002).

Reading comprehension. Reading comprehension is the ability to organize and analyze knowledge; link it to information about the social, biological, and physical worlds; reflect upon it; and take action (Fisher et al., 2016).

Reading engagement. Reading engagement is active text interaction in which students are seeking conceptual understanding of complex topics (Guthrie & Klauda, 2016).

School District A. School District A is a district in southern Missouri with a population of approximately 1500 including students who used Actively Learn during English instruction.

Standardized Test for the Assessment of Reading (STAR). The STAR is a nationally normed assessment that provides educators with scores in five areas of reading comprehension (Renaissance Learning, 2015).

Support reading strategies. Support reading strategies are invoked as needed to "provide the support mechanisms aimed at sustaining responses to reading" (Mokhtari & Reichard, 2002, pp. 252-253).

Unconstrained skills. Unconstrained skills include reading comprehension and vocabulary, which are infinite and continue to develop throughout a person's lifetime (Paris, 2005).

Vocabulary. Vocabulary includes word knowledge and skills for using strategies such as context clues and structural analysis of texts to derive meaning from unfamiliar words (Renaissance Learning, 2015).

Limitations and Assumptions

The following limitations were identified in this study:

Sample demographics. Data for this study were collected using a census of all seniors enrolled in the required senior English course in School District A. Fraenkel, Wallen, and Hyun (2015) maintained regardless of sampling methods, differences between the sample and the population will exist. Since the entire target population was accessible and exceeded the recommended minimum of 30 individuals for a causal-comparative study, the entire population was used (Fraenkel et al., 2015). School District

A is a rural district in south-central Missouri with approximately 1,500 students. The district has a pre-school, an elementary which houses grades K-4, a middle school for students in grades 5-8, and a high school for grades 9-12. The current enrollment for the high school is 427, with 76 of those students comprising the target population. Factors such as gender, socioeconomic status as measured by free and reduced price meal participation, and regularity of attendance during the administration of the independent variable were not taken into account. Due to the confinement of this study to one grade level in one school district, the study may not be replicable.

Teacher experience and knowledge base. The primary investigator for this study, who is also the instructor, was entering her 19th year in public education; 12 of those years were spent teaching 7-12 English, and the remaining seven years were spent in central office administration positions. Hattie (2015) assigned an effect size of 1.59 to collective teacher efficacy, second only to teacher estimates of achievement in the ranking of factors that affect student achievement. Hattie and Yates (2014) cited a large body of studies on teacher expertise and found literature suggests "approaching 10,000 hours of structured practice is the natural prerequisite for elite level performance" (p. 105).

Instrument. For the purposes of this study, the primary investigator obtained permission to use two existing instruments to measure student engagement, reading comprehension, and vocabulary. These instruments were used as originally intended by the developers. Fraenkel et al. (2015) maintained selecting an instrument developed by experts is preferred; it takes less time than developing a new measure, and validity and reliability have already been established. These instruments were administered using the

test-retest method with an interval of three to four months between the pre-test and post-test. For the purposes of most educational research, Fraenkel et al. (2015) stated stability of scores over a two- to three-month period is usually viewed as sufficient evidence of test-retest reliability.

Metacognitive Awareness of Reading Strategies Inventory (MARSI). The MARSI is a tool to help students increase metacognitive awareness and strategy use while reading, and the results can be used for conducting classroom research (Mokhtari & Reichard, 2002). Archival data were collected from an assessment administered prior to the application of the independent variable and an assessment administered after the application of the independent variable to senior English students in one Missouri school district and were analyzed using a *t*-test.

Standardized Test for the Assessment of Reading (STAR). The STAR is a nationally normed test designed as an interim periodic assessment of students' reading skills (Renaissance Learning, 2015). Archival data were collected from an assessment administered prior to application of the independent variable and an assessment administered after application of the independent variable to senior English students in one Missouri school district and were analyzed using a *t*-test.

The following assumption was accepted:

1. The responses of the participants were offered honestly and without bias.

Summary

The measure of success of public schools today cannot be simply the ability of students to persist through graduation (National Center for Educational Statistics, 2017). The measure of success must be that students are provided with skills to realize their

goals and to find fulfillment in their chosen paths (National Center for Educational Statistics, 2017). Reading is a skill fundamentally necessary to this success; however, the fact many students leave high school without the ability to navigate complex texts leads to the need for increased emphasis on these skills during the secondary years (National Center for Educational Statistics, 2017). The onus for improving these skills falls to all secondary teachers, regardless of discipline (Ness, 2016). Current studies have given educators access to information about the most effective teaching practices and how to implement them; the use of metacognitive strategies and feedback are two of these (Hattie, 2012). Increasing access to technology and the plethora of educational tools available via the internet have led to the need for current studies to determine if these tools can be used to increase reading achievement for high school students (Actively Learn, 2017).

In the following chapter, the conceptual framework for this study is expanded to include specifics about research in the fields of the interactive components involved in this study, and a review of the literature that informed this study is summarized. Research on literacy skills and best practices for instruction are examined, as well as the effects of the introduction of digital texts into the classroom. The effectiveness of the instructional strategies of metacognition and feedback are investigated, and a description of the reading platform Actively Learn is included, as well as how Actively Learn incorporates all of the previously discussed elements.

Chapter Two: Review of Literature

Although researchers often refer to the importance of literacy skills for students' academic success in all content areas, these skills are not just academic skills–they are life skills (Anderson, 1985). However, achievement levels in reading at the secondary level have been stagnant for over 40 years (Goldman et al., 2016; National Center for Educational Statistics, 2017). The impetus behind this study was to determine if the use of a new technological tool which provides the instructor with the opportunity for immediate feedback to students had an effect on student engagement while reading and subsequent reading comprehension and vocabulary scores. This tool provides the teacher an insight into student thinking during reading and the opportunity for the teacher to provide immediate feedback as corrective action (Actively Learn, 2017).

Definitions of categories of reading skills and best practices in the teaching of those skills are included in this chapter. Since electronic texts were used in this study, research on student interaction with electronic texts was also reviewed. In addition, a review of research in the areas of metacognition and feedback and the role they play in improving academic achievement in the area of reading is provided. Information is provided on the independent variable in this study, the online reading platform Actively Learn. Topics for the review of literature include literacy skills, teaching methods, electronic texts, metacognition, feedback, and Actively Learn, respectively.

The literature reviewed for this study was chosen with the purpose of providing an historical background, as well as current best practices, in the teaching of the discrete areas of reading achievement. The primary investigator attempted to apply the independent variable in the study using the most effective content and pedagogical

methods. Literature reviewed in the areas of literacy skills and teaching methods included only scholarly work by those considered experts in the field whose studies and writings continue to remain relevant to educators and researchers, regardless of the age of the studies. Research in the area of literacy skills has historically focused on the foundational skills taught in elementary school and on remediating secondary students who have deficient reading skills; since this study focused on the largely ignored area of increasing reading skills for the mainstream secondary student, available literature related to these students was also reviewed. The area of electronic texts is relatively new for researchers, limiting the amount of research available at this time. This section includes current research in this field performed for a broad range of purposes.

Although the areas of motivation and engagement, metacognition, and feedback have been studied extensively by educational researchers over the last century, sometimes under different names, the research for these sections includes primarily current studies and writings while briefly reviewing the history of the inclusion of these topics in various studies on academic achievement factors. Since Actively Learn is such a new resource, there are no existing completed studies on the effectiveness of its use in the classroom. The literature for this section comes from information provided by the company that developed the platform in the form of a white paper written within the last year. This researcher attempted to provide the first insights into the effectiveness of this platform on secondary reading achievement.

Conceptual Framework

The conceptual framework of this study was guided by three interacting components. The first component is predicated upon the principle that the two literacy

skills that continue to develop throughout a lifetime are reading comprehension and vocabulary, which are inherently linked (Fisher et al., 2016; Paris, 2005), but these skills have shown no significant growth in the last four decades for high school students in the United States (National Center for Educational Statistics, 2017). The second component is the ability of a teacher to teach and foster metacognitive and self-regulation skills in students directly, a practice that researchers have shown has a beneficial effect on reading comprehension (Fisher et al., 2016). The third component is feedback, a necessary element to promote the development of metacognitive skills and another research-based effective teaching strategy (Hattie, 2012). The goal of this study was to determine if the stagnated reading comprehension and vocabulary skills of secondary students can be affected by making the metacognitive processes of students more visible to the teacher and providing the opportunity for more effective feedback.

Paris (2005) used the terms "constrained" and "unconstrained" to define two categories of reading skills which were the basis for defining the skills emphasized and measured in this study. Paris (2005) contended reading research mistakenly regards the individual component skills of reading development as similar in scope and importance, and that a reexamination of these research principles is necessary. Constrained skills of alphabetic knowledge, phonemic awareness, and fluency are finite skills developed to mastery in childhood and necessary to progress in the unconstrained reading skills, reading comprehension and vocabulary, which continue to develop in a reader throughout a lifetime and cannot be adequately measured while the foundational skills are in developmental stages (Paris, 2005). Nippold (2017), while in agreement foundational skills must be mastered for reading comprehension to occur, maintained these skills

continue to refine themselves beyond the early years, and adolescents who display difficulty comprehending texts may have deficits with these foundational skills rather than comprehension skills.

Metacognition, or thinking about thinking, is particularly important for students striving to gain reading skills (Fisher et al., 2016). Afflerbach (2014) contended automaticity in self-assessment, a form of metacognition, is the desirable state for readers to be successful in constructing meaning from texts. However, Ritchhart et al. (2011) emphasized thinking is an invisible process, and in order to assess students' proficiency in this area, the goal of the teacher must be to extract information that makes the readers' thinking visible. Fisher et al. (2016) suggested educators provide questions for students to query their understanding as they read and to teach them to generate their own questions. Feedback from the teacher, the third component of the framework for this study, also has a significant effect (.75) on metacognitive and self-regulatory skills (Fisher et al., 2016).

Marzano (2017) described the role of the teacher in providing feedback as communicating clear learning goals and knowing where the student is along the progression toward those goals. Teachers must also provide students with the knowledge of how to close the gap between where they are and where they need to be (Kallick & Zmuda, 2017). Another function of feedback is to help students discern which goals are realistic, since students are motivated by knowledge gaps that are perceivable and closable (Hattie & Yates, 2014). The crafting of good questions by teachers and the process of students learning to ask questions about their own work directly link the components of metacognition and feedback and are both powerful models for learning

(Kallick & Zmuda, 2017). Kallick and Zmuda (2017) promoted the idea of using technology to provide feedback virtually through video conferencing, audio commentary, and written commentary, a major component of the reading platform Actively Learn, the subject of this study.

Trends in Reading Instruction

The earliest text used for instructional purposes in the United States, the hornbook, dates to 1607 and was used in the Jamestown settlement (Vogt & Shearer, 2011). The hornbook was usually a single sheet of paper containing the uppercase and lowercase alphabet, a syllabary, invocation, and the Lord's Prayer (Monaghan & Barry, 1999). In later years, during the mid-1600s, students would move from the hornbook to a primer; then to the psalter, or book of psalms; then to the Bible, the ultimate goal of the reading curriculum (Monaghan & Barry, 1999). From the 1600s through 1840, religious and patriotic views dominated instruction, with emphasis in the area of reading on knowledge of the alphabet, memorization of Bible verses, spelling bees, oral reading, and elocution (Vogt & Shearer, 2011). Oral reading was the primary focus of reading instruction during this time; it was not until the early twentieth century that a silent reading movement began (Monaghan & Barry, 1999).

During the 1820s, the work of Horace Mann criticizing the meaninglessness to the students of many texts in use caused a reexamination of texts and teaching methods whose effects continue in education today (Monaghan & Barry, 1999). Another ongoing education debate, the teaching of words in a part-to-whole or a whole-to-part method, began in the 1830s (Monaghan & Barry, 1999). The westward expansion and industrial revolution of the mid and late 1800s also contributed to a need for a more educated

population (Vogt & Shearer, 2011). Primary reading instruction during this time focused on alphabet knowledge, phonics, syllables, and sight words (Vogt & Shearer, 2011). Comprehension questions were also included, with ever-increasing text difficulty levels in the popular *McGuffey Reader* lessons (Vogt & Shearer, 2011). Throughout the nineteenth century, the continuing rhetoric of Mann and Colonel Francis Parker was urging the replacement of the repetitive drill of letters and sounds with integrated curriculum and innovative language experiences (Pearson, 2000).

It was in the early years of the twentieth century that the purpose of reading instruction shifted from being able to read the Bible to reading for informational and commerce purposes (Vogt & Shearer, 2011). In an effort to identify leaders in the armed forces during World War I, development of large-scale assessments began; revisions of some of these early assessments are still used today, including those developed by William S. Gray and Edward Lee Thorndike to measure oral reading and reading comprehension (Pearson, 2000). Thorndike's measurement fostered new research in the field of reading (Monaghan & Barry, 1999). Early twentieth century studies also reinforced the movement toward silent reading, finding that children had greater comprehension when reading silently rather than orally (Monaghan & Barry, 1999).

It was also during this time period, the late nineteenth and early twentieth centuries, that the work of John Dewey influenced the growth of progressive education and a focus on a child's interests became a factor in education (Monaghan & Barry, 1999). The continuation of the argument over whole-to-part or part-to-whole of the nineteenth century can be found in the first half of the twentieth century (Vogt & Shearer, 2011). Although the language of the debate had evolved, and it was no longer about

whether or not to teach phonics, it was still debated whether students should first learn the parts, then blend them into words (synthetic phonics) or first learn the words, then analyze the parts (analytic phonics) (Pearson, 2000). During the 1920s and 1930s, readability formulas also began to be developed in an effort to better match texts to children's interests and developmental levels (Pearson, 2000).

The mid twentieth century found the educational community searching for ways to provide consistency in instruction, a result of little in the way of teacher education programs, and resulting in leveled readers, scripted teachers' guides, and "most commonly used" word lists (Vogt & Shearer, 2011). From 1935 to 1965, the educational community sought to fine-tune and elaborate upon the instructional models of the past three decades (Pearson, 2000). The advent of content area reading also came about during the World War II era, when many soldiers were unable to read well enough to comprehend training manuals (Vogt & Shearer, 2011). In 1957, the launching of *Sputnik* by the Russians brought the "Race for Space" to the United States and initiatives to reform science, math, and reading in schools while also increasing the age of mandatory school attendance (Vogt & Shearer, 2011, p. 10).

The 1960s saw much in the way of research and response in the area of reading instruction, with Lyndon Johnson's signing of the Elementary and Secondary Education Act of 1965, which had the goal of providing additional resources to vulnerable student populations (Pearson, 2000). In 1967, Jean Chall published, *Learning to Read: The Great Debate,* in an effort to uncover once and for all the definitive "best methods" for reading instruction; findings of this study included recommendations for explicit phonics instruction in the primary years (Barry, 2008, p. 44). Chall's recommendations also

included what were to become the beginnings of a "balanced" approach: language, good teaching, and appropriately leveled instructional materials (Barry, 2008, p. 44). However, the debate over phonics and holistic reading instruction continued into the late 1960s, with no definitive results in research studies that either should be considered the "best method" for teaching children to read (Vogt & Shearer, 2011, p. 11).

The effort to find one best way to teach reading continued into the 1970s with increasing emphasis on programmed reading, sequential lessons, color-coded text, and scripted teaching guides in an attempt to provide beginning readers with consistency, explicit instruction, practice in decoding, and texts with specific linguistic elements (Vogt & Shearer, 2011). Basal readers were a primary component of classrooms with an overemphasis on drills and workbooks (Barry, 2008). During the 1970s, as teachers placed greater emphasis on phonics and decoding, proficiency in reading comprehension declined, resulting in the development of a discrete list of comprehension sills and exercises (Vogt & Shearer, 2011). Reading comprehension became a focus of reading instruction in the early 1980s (Pearson, 2000). Emphasized reading comprehension skills included, "…finding the main idea and supporting details, sequencing, drawing conclusions, making generalizations, comparing and contrasting, and identifying cause-and-effect relationships" (Vogt & Shearer, 2011, p. 13). The trend of highly structured, detailed teacher's guides continued into the 1980s, and primary instructional materials during this time were basal reading programs, including leveled readers, phonics activities, and comprehension skill practice (Vogt & Shearer, 2011).

In 1983, the U.S. Department of Education published, *A Nation at Risk: The Imperative for Educational Reform*, which was very critical of the current state of public

education and provided an impetus for a plethora of educational reforms (The National Commission on Excellence in Education, 1983). During the 1980s and continuing into the 1990s, theorists and researchers began to explore how readers think about text, make connections while they read, and construct meaning (Vogt & Shearer, 2011). The importance of prior knowledge and experience began to be discussed, as well as how educators could build students' backgrounds, promote concept formation, and forge connections among language processes (Vogt & Shearer, 2011).

It was during this time that the whole language movement took place, decreasing the emphasis on discrete skills such as phonics, decoding, and comprehension for about a 10-year period (Vogt & Shearer, 2011). *Becoming a Nation of Readers* supported this pedagogical shift (Anderson, 1985). Barry (2008) saw this as an understandable reaction on the part of progressives to the overly structured approaches of the prior decade. However, these holistic instructional approaches came under scrutiny as standardized tests in states where they were used reflected low reading performance of students (Barry, 2008; Vogt & Shearer, 2011).

In 2002, the No Child Left Behind Act (NCLB), a reauthorization of the Elementary and Secondary Education Act of 1965, was signed into law (U.S. Department of Education, 2002). This act set the expectation that all students would meet or exceed state standards in reading and math by 2014, along with the requirement that states implement testing in these areas within three grade spans, and that schools would meet adequate yearly progress in these areas or face losing accreditation (U.S. Department of Education, 2002). It also gave parents of students who attended Title I schools who did not meet adequate yearly progress the option of school choice (U.S. Department of

Education, 2002). Under the act, the Reading First program was also established, giving additional funding for schools to implement research-based programs in grades K-3, but schools were restricted as to what reading programs qualified them for this funding (U.S. Department of Education, 2002). More rigid standards and testing requirements led to a more focused and goal-oriented approach to process-oriented reading and writing instruction at the beginning of the twenty-first century (Vogt & Shearer, 2011). Cognitive self-assessment, or metacognition, as well as student-to-student scaffolded interaction were widely used to increase reading comprehension and develop critical language skills, with the teacher's role as that of cognitive coach (Vogt & Shearer, 2011).

As it became obvious that the 2014 expectations set by NCLB were not attainable, the next iteration of federal law was developed and put into effect in 2015, the Every Student Succeeds Act (ESSA), the seventh reauthorization of ESEA (U.S. Department of Education, 2015). This act put the onus on states to develop a plan to meet the needs of underachieving groups of students, while allowing more latitude than NCLB in how they do so (U.S. Department of Education, 2015). It is currently too early to study the lasting effects ESSA will have on reading instruction; however, it does authorize Literacy Education for All, Results for the Nation (LEARN), authorizing grants for evidence-based literacy instruction in high-needs schools (Heitin, 2016).

Literacy Skills

The act of reading is a relatively recent invention, only about 6,000 years old, and unlike the acquisition process for spoken language, specific intervention is required to train the human brain to utilize spoken language structures to learn to read (Fisher et al., 2016). This is commonly referred to as reading instruction (Fisher et al., 2016). The act

of reading requires the consolidation over time of six distinct facets: phonemic awareness, alphabetics, phonics, fluency, vocabulary, and reading comprehension (Fisher et al., 2016). These skills were categorized by Paris (2005) as constrained and unconstrained based upon whether each skill has a finite boundary or limit (constrained) or whether development of the skill can advance infinitely throughout a person's lifetime (unconstrained). However, the unconstrained skills are not equally so; while phonemic awareness and alphabetics are the most constrained, made finite by the letters of the alphabet and the sounds each can make, phonological awareness and fluency are less constrained than those skills, while being more constrained than comprehension and vocabulary development (Stahl, 2011). There is codependency among these foundational constrained skills, as they are reliant upon each other in the early years, but this disappears in the middle years when mastery has been achieved (Stahl, 2011).

According to Stahl (2011), letter knowledge, phonics, spelling, and phonological awareness have strong relationships with each other but little relationship to oral language or broader academic knowledge. Once children master the constrained skills, they can accurately and automatically read most words; this generally happens by the end of third grade (Snow & Matthews, 2016). Beyond third grade, reading comprehension requires children to understand words rarely found in spoken language and to integrate new textual information with relevant background knowledge, moving them into the realm of unconstrained skills (Snow & Matthews, 2016).

The foundational constrained reading skills–phonemic awareness, alphabetics, phonics, and fluency–must be acquired by young readers, but are not the final destination of reading instruction (Fisher et al., 2016). Constrained skills need to be taught to levels

of automaticity due to their necessity in the development of more complex reading abilities; however, automaticity alone is not sufficient to develop these more complex skills (Stahl, 2011). The areas of fluency and comprehension depend upon the critical skill of word recognition, and orthographic representations are integral to acquiring automaticity in these skills (Metsala & David, 2016). Fluency growth is initially rapid, but over a period of approximately five years, slows in intermediate grades until a reading rate between 125 and 150 correct words per minute is achieved (Stahl, 2011).

Reading fluency is the last constrained reading skill in which students reach their maximum potential (Paris, 2005). Schwanenflugel and Kuhn (2016) defined the elements of reading fluency as word recognition, pacing, phrasing, and intonation when reading orally and found it can limit or support comprehension in both oral and silent reading. Shanahan, Fisher, and Frey (2012) defined true fluency as maintaining understanding across a text. Duncan et al. (2016) cited fluency as a predictor of reading comprehension and contended increases in reading fluency may allow more efficient comprehension of extended texts by freeing up processing capacity.

Schwanenflugel and Kuhn (2016) also asserted that while poor fluency can interfere with comprehension, good fluency does not guarantee it; vocabulary limitations, lack of topic knowledge or knowledge of the language, and the inability to draw inferences can also contribute to difficulties in reading comprehension (Schwanenflugel & Kuhn, 2016). However, there is a strong correlation between reading fluency and comprehension, usually between .50 and .85 in elementary children (Schwanenflugel & Kuhn, 2016). Duncan et al. (2016), however, found if a test of reading comprehension is timed, a direct relationship with fluency is more likely. Fluency, although grouped with

the constrained reading skills, some researchers argue is actually a transition between learning to read using phonemes, basic letter patterns, and decoding, and the higher level skills of reading to learn, the acquisition of reading comprehension, and vocabulary skills (Schwanenflugel & Kuhn, 2016).

Many researchers have focused on the development of foundational reading skills in primary school years, as these are considered the basis for future academic success. Stahl (2011) revealed the easily quantifiable constrained skills tend to dominate school assessment systems during these years; however, tests of isolated skills reflect mastery only of the skills, not the ability to make sense of texts. Snow and Matthews (2016) also recognized excessive focus on easy-to-teach and test-constrained skills in kindergarten through third-grade classrooms. Nippold (2017) found deficits in reading comprehension in adolescents can be predicted by deficits in lexical development, syntactic development, and word reading ability as early as age six. Duncan et al. (2016) also suggested the foundational reading skills of word identification and text reading fluency form a strong correlation to reading comprehension in early adolescents. Stahl (2011) noted that as texts become more complex, automatic word recognition is necessary but insufficient for comprehension.

Snow and Matthews (2016) emphasized unconstrained skills are more strongly predicted by children's social class or parental education and are more difficult to influence through classroom instruction than constrained skills. Metsala and David (2016) cited various studies linking socioeconomic status and reading achievement through vocabulary acquisition; preschoolers demonstrate differences in vocabulary knowledge based on the advantage level of their background. As children learn to read,

vocabulary becomes increasingly important; if a child already knows the meaning of a word, both decoding and comprehension are easier, resulting in increased fluency and understanding (Snell, Hindman, & Wasik, 2015). Students may also struggle with comprehension due to lack of background knowledge, text structure difficulties, idea density, or unfamiliarity with vocabulary (Stahl, 2011).

Although researchers have found that teaching vocabulary does not guarantee success in reading, vocabulary knowledge is a strong predictor of reading comprehension (Fisher et al., 2016). Vocabulary has an impact on various other literacy skills (Metsala & David, 2016). It has a direct impact on word recognition and comprehension, as knowledge of word pronunciations and meanings facilitates both of these skills (Metsala & David, 2016). Laufer and Aviad-Levitzky (2017) categorized learners' receptive vocabulary into sight vocabulary and comprehension vocabulary. Words that are automatically comprehended even when they appear in isolation are sight vocabulary; students with a large sight vocabulary have an advantage while reading, as cognitive resources freed from decoding words can be used for text comprehension (Laufer & Aviad-Levitzky, 2017). Comprehension vocabulary includes sight vocabulary and words of which the reader has partial knowledge as well as words that can be recalled through cues (Laufer & Aviad-Levitzky, 2017).

The domain of vocabulary has complexities that make it challenging to teach and assess; the use of vocabulary knowledge to construct meaning while reading is influenced by text, context, and reader characteristics (Kieffer & Stahl, 2016). This is compounded by the fact vocabulary is an unconstrained reading skill and continues to develop during a reader's lifetime (Paris, 2005). Assessments in this area are primarily of two types,

recognition and recall, neither of which asks readers to demonstrate knowledge of the word by providing the meaning (Laufer & Aviad-Levitzky, 2017).

Recognition tests may overestimate learners' knowledge due to successful guessing on the part of the test taker, but have been found to be better predictors of overall reading comprehension (Laufer & Aviad-Levitzky, 2017). Successful comprehension in the area of vocabulary requires not only knowing the definition of a word, but also knowledge of multiple meanings and variations dependent upon connotation and context (Kieffer & Stahl, 2016). Researchers have revealed concerning patterns in vocabulary instruction, as teachers are given little guidance on specific instructional strategies in commonly used reading curricula; as a result, vocabulary instruction is infrequent and cursory (Snell et al., 2015).

Duncan et al. (2016) concluded text-specific vocabulary knowledge is the strongest and most-consistent predictor of comprehension in adolescents and a reliable predictor of inferential comprehension. For new vocabulary acquisition, the reader must encounter unknown words in texts; however, the context for word recognition is weakened if a text has too many unknown words (Allington, McCuiston, & Billen, 2015). Good readers are more successful at acquiring vocabulary, which enhances the likelihood they will continue to increase their store of known vocabulary, as a larger vocabulary increases the ability to learn new words in context (Allington et al., 2015). Although the high correlation between vocabulary knowledge and reading comprehension has been recognized for decades, research is still needed in the area of explaining this relationship (Kieffer & Stahl, 2016). Multiple theories exist as to whether one is dependent upon the other, or if the relationship is reciprocal (Kieffer & Stahl, 2016).

Reading comprehension, like vocabulary, is a fundamental skill required to move students from surface learning to deep knowledge and the ability to transfer this knowledge to other contexts (Fisher et al., 2016). One of the strongest predictors of reading comprehension in grades 1-3 is word recognition, and proficiency in accurate and quick word recognition early in the process of learning to read is important to later reading achievement (Metsala & David, 2016). Metsala and David (2016) reviewed the research on the two most influential and extensively argued frameworks to develop word recognition: whole-word or orthographic representations, also known as sight words; and phonological recoding, commonly known as "sounding out" words based on sound-spelling correspondence (p. 94). They supported the teaching of phonology first, then orthography, based upon the fact phonological recoding is necessary for the formation of higher-level orthographic representations (Metsala & David, 2016). However, Metsala and David (2016) acknowledged further research is needed in this area, as it remains unclear whether differences in orthographic representation skills are the result of or the cause of skill in word recognition.

Not only does the skill of reading comprehension vary widely among individual students, but the definition of comprehension also varies widely among researchers and contexts. Comprehension may refer to the ability to reproduce parts of the text, the ability to analyze the information in the text, or the ability to use or apply the information, as well as other abilities (van den Broek, Mouw, & Kraal, 2016). The skill of reading comprehension involves the construction of a mental representation of the meaning of the text, and to fully understand this area, both this mental representation, the

product of reading, and the process by which the representation is constructed must be understood (van den Broek et al., 2016).

Successful comprehension requires the reader to combine elements of the text with the critical area of background knowledge (van den Broek et al., 2016). The reader's ability to use the information to perform tasks based upon the text may be compromised in the case of struggling readers (van den Broek et al., 2016). The process by which the reader identifies relationships between textual elements and his or her background knowledge is its own discrete area (van den Broek et al., 2016). Interventions to address comprehension must impact deficiencies in these processes and the cognitive factors that affect them, such as the ability to infer, attentional and working memory capacities, and lack of background knowledge (van den Broek et al., 2016).

Teaching Methods

One major impetus in the improvement of reading skills and the methods used for instruction in the United States is governmental policy, both at the state and federal levels (Shanahan, 2014). The funding tied to federal initiatives has directly influenced teaching methods in individual classrooms, although public education officially falls under the purview of state and local governments (Shanahan, 2014). A recent example of this is the Reading First grant, a response to Title I schools not meeting state standards (Shanahan, 2014). The prescribed research-based curriculum required by Reading First grant recipients, largely a result of the National Reading Panel's findings, was recommended for adoption for all Title I schools not meeting state standards; as a result, there has been nationwide adoption of these standards and practices (Shanahan, 2014). However, after 15 years of these large changes in practice, data show only small

improvements in first-grade decoding skills, but no other impacts (Snow & Matthews, 2016).

In a study of the historical research of individual differences in reading, Afflerbach (2016) reported reading instruction programs focus on approaches to sound-symbol relationships but ignore the affective differences, such as developing self-efficacy as readers in children. Afflerbach (2016) cited myriad studies addressing the physical, physiological, and psychological states of readers and how these interact with the observable, measurable skills of achievement in phonemic awareness, fluency, and reading comprehension. Afflerbach (2016) asserted although copious research exists on the connection with the affective and the measurable skills, there is a disjuncture between current policy and practice in the area of reading instruction and research and theory related to the affective aspect of individual differences.

Afflerbach (2016) took umbrage with the fact current federal policy in reading is heavily influenced by the National Reading Panel Report of 2000, which concluded phonemic awareness, phonics, fluency, vocabulary, and comprehension must be the focus of reading instruction. As a result, these five areas are also the focus of reading assessment and the resulting funding, or lack thereof, in the form of grants for schools based on assessment results (Afflerbach, 2016). Afflerbach (2016) asserted teaching and assessing of reading skills must take into account affective areas outside cognitive strategies and skills for which there are no standardized tests. However, Afflerbach (2016) alluded to the barriers to change these policies, including economic interests of

testing companies, textbook companies, and others who provide services and goods to the educational community.

One important predictor of success in the areas of reading comprehension and word identification is one which is out of the teacher's control: prior knowledge (Shanahan et al., 2012). However, this prior knowledge must be activated and processed from long-term memory (Kostons & Werf, 2015). In order to leverage a student's prior knowledge, teachers must know what the student already knows and build on and extend this knowledge (Fisher et al., 2016). Nippold (2017) asserted readers who are more knowledgeable are better able to draw inferences and create more coherent mental representations, allowing for deeper levels of comprehension.

Shanahan et al. (2012) contended, "Students' background knowledge, including developmental, experiential, and cognitive factors, influences their ability to understand the explicit and inferential qualities of a text" (p. 61). Lemov (2017) stated, "Recent research shows that reading comprehension, deep thinking, and even creativity all rely heavily on prior knowledge" (p. 10). Kostons and Werf (2015) emphasized prior knowledge influences what a person remembers and improves memory for new information. Memory improvement is accomplished through improved coding by being able to store new information in larger pieces, form useful associations that forge stronger connection between information elements, and make decisions about useful approaches (Kostons & Werf, 2015).

Instruction of constrained skills is most effective and efficient when it is explicit, systematic, intense, short in duration, and targeted to students' developmental levels (Stahl, 2011). Stahl (2011) warned that in an effort to ensure fidelity to research-based

programs, primary teachers may use time-consuming instruction directed at the masses of students instead of individual developmental zones. They sacrifice massed time required for teaching and learning of unconstrained skills, compromising academic achievement in general reading abilities at the upper levels (Stahl, 2011). Snow and Matthews (2016) agreed with this, contending constrained skills are easier to improve due to well-defined goals and proven approaches to teaching and assessing them.

Teaching of the most constrained skills, alphabetics and phonemic awareness, also referred to as letter sounds and letter names, has advanced due to current research (Stahl, 2014). Vaughn et al. (2015) asserted this focus on research for beginning reading has been conducted with the expectation that an understanding of how students learn to read will allow educators to make significant progress in addressing reading problems. These foundational skills are important, because alphabet knowledge in kindergarten and first grade predicts later literacy achievement (Stahl, 2014). Stahl (2014) cited studies finding the common practice of teaching one letter per week does not allow time to provide intense practice for the most difficult letters for children to learn. Since some letters and their resulting sounds are more difficult for children to learn than others, teaching one letter per day in multiple cycles, then adjusting instruction as some letters are mastered, has been found to be a more effective teaching method (Stahl, 2014).

The debate over the best method to build foundational reading skills has, for decades, centered around two approaches: skill emphasis or meaning emphasis, commonly referred to as whole language versus phonics instruction (Allington & Gabriel, 2016). Allington and Gabriel (2016) cited studies in which both methods were found to be effective but had different outcomes for readers. Readers taught with an explicit focus

on decoding were better at single-word decoding, but readers taught using sight words could read more fluently, although they were constrained by the words with which they were familiar (Allington & Gabriel, 2016). However, on standardized tests, by the end of first grade, there was no difference between the two groups (Allington & Gabriel, 2016). Allington and Gabriel (2016) concluded there is no best approach; however, with today's diversity within classrooms, the blended approach incorporating both methods of instruction has become increasingly popular with educators.

The connecting factor between the use of foundational decoding skills to advance unconstrained skills is fluency (Shanahan et al., 2012). Bendak (2018) asserted reading fluency is necessary for comprehension, since the automaticity of fluency allows the reader to devote attention to the task of comprehension. Shanahan et al. (2012) contended fluency instruction should emphasize sentence structure and meaning. Bendak (2018) found repeated readings of simplified texts have a statistically significant impact on both reading fluency and reading comprehension. Teachers should include pauses for discussion of the meaning of the text, pair repeated reading of the text with questioning, and incorporate close reading to build fluency (Shanahan et al., 2012).

The introduction of increased Lexile levels in the Common Core State Standards focused attention on text complexity, which is measured based on the factors of complex sentences and challenging vocabulary (Shanahan et al., 2012). Teachers are increasingly expected to guide students through increasing levels of text complexity as conversations take place about increasing expectations for readers, especially in the area of informational text (Fisher & Frey, 2014b). As students' reading skills advance, the unconstrained area of vocabulary must be taught for depth and transfer; surface-level

exposure to a wide range of words is not effective for building vocabulary skills that lead to increased reading comprehension (Fisher et al., 2016). Fisher et al. (2016) asserted teachers must choose vocabulary to be taught based on the features of each word and the likelihood it will be acquired through other means; only those that cannot be acquired through repetition or analysis should be considered for direct instruction. Word choice must be decided based upon the relative challenge or complexity of the word, with attention to a balance between basic and more complex words (Snell et al., 2015).

Rather than the intense teaching sufficient for constrained skills, teaching vocabulary requires repeated and varied opportunities for reading, writing, and incorporating the words in speech to acquire refined use of the target vocabulary (Stahl, 2011). Word learning seems to be promoted by distributed practice, meaning the word is returned to, used, and reviewed over several days and weeks (Snell et al., 2015). Snell et al. (2015), following a meta-analysis of 34 rigorous experimental studies, identified five research-based strategies for teachers to use during the early years: define new words, discuss and ask children questions about new words, reread books several times, have children retell stories from books, and integrate new words and definitions throughout classroom activities (Snow & Matthews, 2016).

Lemov, Driggs, and Woolway (2016) divided vocabulary instruction into two categories: explicit and implicit. Explicit instruction is the direct teaching of words using discrete lessons and activities, while implicit instruction is used to increase students' abilities to learn new words they encounter while reading a text (Lemov et al., 2016). Shanahan et al. (2012) supported both explicit and implicit instruction, encouraging the use of explicit exploration of definitions, synonyms, antonyms, categories, and specific

examples, as well as the opportunity to analyze the use of vocabulary terms in texts. Kieffer and Stahl (2016) cited consensus among researchers on effective vocabulary instruction methods. Principles guiding effective instruction in this area include the following: providing definitional and contextual information about words; engaging students in deep processing of the words' meanings and uses; and providing multiple and meaningful exposures to the words (Kieffer & Stahl, 2016). However, more research is needed to inform vocabulary instruction that accommodates individual differences in learners (Kieffer & Stahl, 2016).

As student skills advance, teacher questioning methods are paramount for successful reading comprehension instruction (Fisher et al., 2016). An examination of the questioning habits of fifth- and sixth-grade reading teachers found 54% of questions were at the basic recall level, leading to surface-level learning rather than deep or transfer learning (Fisher et al., 2016). However, the discussion of surface-level subject matter cannot be discounted as a valuable part of the acquisition and consolidation of learning, as this improves both literal and inferential comprehension of texts (Fisher et al., 2016). However, to effectively improve reading comprehension, van den Broek et al. (2016) found questioning techniques that encourage coherence-building inferences can be particularly effective when implemented during reading, because they change the processing. Although great emphasis is put on the skill of inference, Lemov (2017) asserted that, particularly in the case of non-fiction texts, understanding is the result of prior knowledge, not inferencing.

Hong-Nam, Leavell, and Maher (2014) suggested explicit teaching of reading comprehension strategies has been shown to help readers acquire procedural knowledge

and improve comprehension. However, the distinction between high- and low-achieving students in the area of reading comprehension when both groups possess procedural knowledge of application of reading strategies is the ability to think metacognitively (Hong-Nam et al., 2014). Nippold (2017) found teaching comprehension strategies such as previewing the text, using metacognitive self-regulation, identifying the main idea, and summarizing will not build comprehension in students who have deficits in word reading ability. The teaching of unconstrained skills calls for cognitive flexibility, critical analyses, and contextual variation and requires teachers to begin with direct instruction, move to guided practice, then to independent practice; the process then begins again with a different genre or more difficult text (Stahl, 2011).

At the secondary level, Vaughn et al. (2015) reported differences in necessary reading skills based upon content area and the need for content-specific explicit instructional strategies for accessing texts. Wigfield, Gladstone, and Turci (2016) stated, "Proficient reading comprehension is crucial for success in every academic domain….As students advance in their education they are expected to read and write across disciplines with increasing skill, flexibility, and insight" (p. 190). Allington et al. (2015) cited 70 years of evidence that students are more likely to learn content "…when the text can be read with a high level of accuracy and comprehension" (p. 492).

Schoenbach and Greenleaf (2017) attributed poor attitudes toward assigned reading at the secondary level on the part of students to a lack of strategies to address differentiation in subject-area reading materials, from charts and diagrams to primary documents to literature. Teachers sometimes opt to stop assigning challenging text, instead delivering content through lectures due to a belief they do not have the knowledge

to help students understand or that it is the responsibility of only the English teachers to help students develop these abilities (Schoenbach & Greenleaf, 2017). Hooley and Thorpe (2017) found secondary teachers cite various reasons for the absence of any formal reading instruction for their classroom texts, particularly lack of literacy training, perceived roles, and class time constraints which prohibit them from covering both required disciplinary content and reading instruction.

At the secondary level, one current approach to improving comprehension of text is the practice of close reading. This is partially due to the emphasis of this practice in the Common Core State Standards (National Governors Association Center for Best Practices, 2010). Snow and O'Connor (2016) defined close reading as "…an approach to teaching comprehension that insists students extract meaning from text by examining carefully how language is used in the passage itself" (p. 1). Lemov et al. (2016) defined it as "…the methodical breaking down of the language and structure of a complex passage to establish and analyze its meaning" (p. 61). Springer, Wilson, and Dole (2014) added the integration of prior knowledge to text-based evidence in their definition of close reading and urged teachers to require repeated scaffolded readings of a passage of text while orally modeling thinking and questioning techniques and explicitly teaching annotation techniques to support textual analysis.

A study of struggling middle school students who used close reading of texts indicated positive outcomes on reading comprehension (Fisher & Frey, 2014a). Proponents of close reading declare it levels the playing field by drawing support for claims only from the text itself, eliminating differences in comprehension due to background knowledge (Snow & O'Connor, 2016). Another argument in favor of close

reading is that it gives students opportunities to learn to struggle with text, a natural process engaged in by all good readers and one everyone should learn (Snow & O'Connor, 2016). Lemov et al. (2016) asserted learning this skill allows students to read texts that would otherwise be above their comprehension levels and assists them in developing the ability to gain comprehensive understandings of these texts.

However, the struggle associated with close reading can also be a threat to its effectiveness if it causes students to avoid the process due to its tedium (Snow & O'Connor, 2016). The experience of struggling with text can be helpful in demonstrating what is missed with casual, superficial reading and that students do have resources for constructing meaning (Snow & O'Connor, 2016). Hooley and Thorpe (2017) found students avoid integrating reading by skimming content only to find answers to assigned questions. The technique of close reading is excellent for probing sentence structure, nuances of word meaning, subtleties of text organization, and structure of textual arguments (Snow & O'Connor, 2016). However, the misuse of close reading strategies by classroom teachers who use it to the exclusion of other comprehension-building activities or who too stringently apply rules limiting discussion that excludes all outside sources can limit its effectiveness (Snow & O'Connor, 2016). Another struggle for teachers is fitting close reading into class schedules, as reading the text, annotating and marking key ideas, summarizing, rereading, and discussion can take a considerable amount of time (Fisher & Frey, 2016).

In a study to determine the effectiveness of other methods of reading instruction than close reading to address maintaining higher levels of reading comprehension without sacrificing text complexity with students of all ability levels, Fisher and Frey (2016)

found several other successful approaches. The use of learning intentions provides students with the cognitive resources needed to access complex texts by teacher communication of the target of the lesson multiple times during the lesson (Fisher & Frey, 2016). Hattie (2012) stated targeted learning requires being clear about what is to be learned from the lesson and having a way of knowing that the desired criteria has been achieved. Another effective approach to introducing increasing levels of text complexity to students is the teacher think-aloud, or a verbal description of the thinking that one does while attempting to understand complex texts (Fisher & Frey, 2016). Fisher and Frey (2016) maintained, "…Learners can be apprenticed into ways to address inevitable cognitive struggles" (p. 407).

The use of scaffolded reading instruction has also proven beneficial to improve reading comprehension of complex texts (Fisher & Frey, 2016). Scaffolded instruction requires the teacher to work with small groups formed according to students' instructional needs for an extended period of time (Fisher & Frey, 2014b, 2016). The teacher provides guided instruction, or scaffolds, in the form of questions to check for understanding, prompts to trigger cognitive and metacognitive thinking, and cues to shift thinking when the prompts prove insufficient (Fisher & Frey, 2014b). Another effective practice to improve comprehension of increasingly complex texts is allowing students to engage in text-based collaborative conversations (Fisher & Frey, 2016). Although Fisher and Frey (2016) find teachers reluctant to implement this strategy due to the lack of

teacher involvement, observations show students able to access increasingly complex texts using reciprocal teaching methods without teacher intervention.

Reading Motivation and Engagement

Unrau and Quirk (2014) contended that measures of motivation and engagement have become comingled and blurred in the field of educational research due to a lack of clear definition attributed to the fact that they can only be measured by observation of social processes rather than empirical tests. Motivation and engagement where reading is concerned are connected in that "engagement is the visible manifestation of motivation" while "motivation refers to the internal processes that energize and direct behavior" (Guthrie & Klauda, 2016, p. 42). Success in reading comprehension achievement is correlated with student motivation (Wigfield et al., 2016) and reading engagement (Guthrie & Klauda, 2016). Guthrie and Klauda (2016) posited increased achievement, however, is not automatically spurred by motivation, but that it fuels sustained, self-regulated reading activity, and the consequence is increased test scores and grades. Guthrie and Klauda (2016) also determined motivation is positively associated with the amount of reading students do. Wigfield et al. (2016) asserted, "Teachers with extensive knowledge of the most effective reading strategies to instruct their children will succeed only to the extent that their students are motivated to learn and use those strategies" (p. 193).

Measures of motivation and engagement are of two types: observational and self-reported, both of which can be used as the basis for research (Guthrie & Klauda, 2016; Wigfield et al., 2016). Unrau and Quirk (2014) found a greater number of established measures of motivation than engagement. Due to the internal nature of what motivates

students to learn and how deeply they are engaged in their reading, self-reporting measures are most frequently used in studies; these measures have limits, particularly when used with young children (Wigfield et al., 2016).

Behavioral measures of engagement include attention, effort, and persistence in tasks, and Guthrie and Klauda (2016) believed intrinsic motivation and self-efficacy influence behavioral engagement. Other types of engagement include cognitive, which involves deep mental processing and self-regulation; emotional, which includes interest and enthusiasm; and agentic, which refers to proactive, intentional forms of learning (Guthrie & Klauda, 2016). Unrau and Quirk (2014) categorized only three types of motivation: behavioral, affective, and cognitive, with behavioral being the only category that is able to be observed and measured by an instrument that is not self-reported.

To master skills and strategies necessary for reading comprehension, students must commit time and effort to learn them, requiring motivation on the part of the students (Wigfield et al., 2016). Primary drivers of motivation are beliefs, values, and goals (Wigfield et al., 2016). Motivation can be intrinsic, arising from an individual's interests, or extrinsic, based on rewards and grades (Wigfield et al., 2016). Wigfield et al. (2016) found, "Students' intrinsic motivation correlates positively with their reading achievement and predicts their reading achievement over time" (p. 192). Guthrie and Klauda (2016) determined students with high intrinsic motivation from reading enjoyment read three times more than students with relatively low intrinsic motivation, and reading comprehension scores are highly predicted with amount of reading among elementary students. Although extrinsic motivation is positively associated with grades

in reading, it is less likely to positively influence reading comprehension (Wigfield et al., 2016).

Wigfield et al. (2016) found motivation to read decreases across school years. This may be attributed to increased capacity of students to understand their own performance leading to a decrease in self-efficacy as they grow older as practices that encourage competition and comparison to others are more likely in middle school and high school (Wigfield et al., 2016). Guthrie and Klauda (2016) thought self-efficacy is conceptually relevant and integral to reading development because it is highly correlated with achievement from grades K-12. Motivation beliefs central to learning include self-efficacy, or confidence in one's ability to accomplish the task, and a sense of control and autonomy over learning (Wigfield et al., 2016).

Guthrie and Klauda (2016) reported students' self-ratings of their active involvement in learning was predicted by perceived autonomy. Participation has been found to increase when students are allowed input and choices in learning, not just in texts but in activities (Guthrie & Klauda, 2016). As instruction becomes more content oriented, Wigfield et al. (2016) determined restricted reading choices, unappealing texts, and a lack of belief that what they are learning is relevant leads to a decrease in reading motivation. Deeper text comprehension is found among young adolescents when personal interest or relevance rather than task proficiency is used as a basis for reading (Guthrie & Klauda, 2016). Although motivation is considered to be an individual variable, social contexts affect students' motivation, particularly during early adolescence

(Wigfield et al., 2016). Fostering social relationships among students is central to academic acquisitions of dispositions and competencies (Guthrie & Klauda, 2016).

Gender differences in reading achievement are an international phenomena, with females outperforming males on various measures of reading achievement; females also report greater reading motivation than males, and although they report levels of self-efficacy in early elementary school, males' beliefs in their competence in and value of reading declined more rapidly than females' (Wigfield et al., 2016). However, Guthrie and Klauda (2016) reported, in an international measure, reading engagement nearly closed the gender gap in most countries. Furthermore, the study also found diminished differences in achievement between socioeconomic classes when engagement was increased (Guthrie & Klauda, 2016).

Unrau and Quirk (2014) asserted neither motivation nor engagement function in isolation, and there is no clear answer to whether motivation is a facilitator or indicator of engagement; research only supports they both contribute to reading achievement. Identified instructional practices that can foster students' reading motivation and engagement include building self-efficacy by helping them experience success with the materials they read, helping them see the relevance and importance of what they are learning, giving them some autonomy over learning, and allowing social interactions around reading (Wigfield et al., 2016). Guthrie and Klauda (2016) suggested by fostering automaticity of processes fundamental to reading expertise, motivation and engagement can build achievement growth.

Electronic Texts

Reid, Morrison, and Bol (2017) cited lower overhead costs for producing and distributing electronic texts as part of the impetus for the trend in eReading. Furman (2015) asserted technology can be a natural motivator for students, especially those who are struggling to read. Smith (2016) reported digital texts improve student engagement, academic reading levels, and metacognitive strategies when reading, and the use of technology can be a leveling factor among varying socioeconomic classes of students. However, in a study of college undergraduates, Reid et al. (2017) found students do not transfer the same reading strategies when reading digital texts as when reading print-based texts. Students become less accurate in gauging their understanding and may attempt to use other technologies while reading (Reid et al., 2017).

Furman (2015) encouraged teachers to integrate technology resources to assist students to find appropriate and interesting texts and to find forums in which to discuss their evaluations of texts. However, when reading literary works, particularly in the primary school years, Javorsky and Trainin (2014) discovered readers need to master features and navigational tasks when reading electronic texts that are not present in paper books.

Neumann, Finger, and Neumann (2017) found digital and non-digital texts interact and are parallel in nature and that transference and overlap of knowledge through the use of both tools can potentially occur for emergent readers, as they have several common features. Although many book-handling skills, such as reading from left to right and turning pages, are still applicable when reading many online texts, the need exists for readers to transfer these familiar skills to the online reading environment, which can be

more complex, changes rapidly, and is frequently poorly defined (Javorsky & Trainin, 2014).

Interactive features of online books, such as narration, sound capabilities, and text highlighting, can assist in engaging readers in the text or can distract them from it (Javorsky & Trainin, 2014). Digital texts' features can stimulate and engage a greater variety of the reader's senses (Neumann et al., 2017). However, young readers may have difficulty differentiating between links that are part of a digital story and external links embedded to take the reader to advertisements or social media (Javorsky & Trainin, 2014).

There is conflicting research concerning digital versus non-digital texts; some research shows no difference in using e-books or printed books, while other studies demonstrate the reading aloud of traditional print books is more beneficial to reading comprehension (Neumann et al., 2017). Research with older elementary students has indicated background knowledge of the digital environment is activated by strong readers as a means of staying oriented when reading electronic texts (Javorsky & Trainin, 2014). Javorsky and Trainin (2014) encouraged teachers to consider issues that arise when learning to read digital texts for young readers an opportunity to engage in cognitive flexibility.

Neumann et al. (2017) suggested increasing use of digital texts by emergent readers is spurring debate over the role these texts play in literacy development. A lack of understanding about how these skills emerge and influence the development of both digital and non-digital literacy skills has led to a call for a common conceptual framework for both, recognizing children "communicate and construct knowledge

through both digital and non-digital experiences" (Neumann et al., 2017, p. 472). Molin and Lantz-Andersson (2016) concluded the focus of teaching when transitioning from traditional to digital texts needs to be to identify patterns and conventions, regardless of textual form. Leu, Kiili, and Forzani (2016) contended isolated reading acts online, such as reading an email, an online newspaper, or a single web page, do not differ from offline reading comprehension except for the context.

However, Leu et al. (2016) asserted while conducting online research, comprehension skills differ from offline reading comprehension. While conducting online research, readers always invoke a complex sampling process to inform the solution to a problem, and they do this by constructing texts through this sampling process in an unrestricted, poorly structured information space that affords access to new technologies that require various interaction skills of reading and writing (Leu et al., 2016). Offline readers may use this sampling process, but not always, and they are often operating in a more restricted environment with fewer options as to texts (Leu et al., 2016). Leu et al. (2016) also posited that, while both online and offline research and comprehension require higher-level critical thinking, due to the need for critical evaluation of online sources, this skill becomes even more important when using online resources. Leu et al. (2016) suggested further research in this area is needed, as this is one of the few areas of reading comprehension in which research primarily focuses on secondary students; little is known about the online reading practices of elementary students outside of time spent online.

Duncan et al. (2016) expanded the traditional definition of texts and literacy activities to include not only online texts, but all online activities which require reading

skills, such as social media, online searches, and texting. With this expanded definition, studies show a positive association between knowledge of text message abbreviation and spelling performance, the ability to gather useful knowledge for reading comprehension, and a higher incidence of complex predictions (Duncan et al., 2016). The conclusions reached by Duncan et al. (2016), as to links between adolescent reading habits and reading comprehension, show a growing tendency for more time spent with digital than traditional texts; however, more associations with reading comprehension, word identification, and fluency were observed with extended traditional texts. In a study of gender-based behaviors when reading digital texts, Seok and DaCosta (2017) found males have a higher index for digital reading behaviors such as comprehending and scanning for information and are able to maintain focus and read for longer periods of time. Females demonstrate digital reading preferences of reading for entertainment and learning purposes and are more selective of content (Seok & DaCosta, 2017).

Duncan et al. (2016) revealed comprehension strategies increased online as opposed to when reading traditional texts, possibly due to the length of the digital texts. The use of technology and digital texts can help struggling readers with the use of various tools such as built-in dictionaries, text-to-speech settings, and translation tools (Actively Learn, 2017). Hooley and Thorpe (2017) found high school-aged students use digital aids to improve understanding and for web-based tutoring to improve skills. Researchers have reported the successful use of computer technology to teach and assist struggling readers as both a diagnostic and intervention tool (Hooley & Thorpe, 2017). The use of a technology tool that can provide instructional feedback can assist students to become self-regulating learners and help them attribute learning outcomes to their own efforts, an

important motivating factor, particularly for secondary students (Hooley & Thorpe, 2017).

Metacognition

Kolić-Vehovec, Zubković, and Pahljina-Reinić (2014) noted performance in reading is a strong predictor of future educational attainment and success in the labor market; attaining the highest levels of text comprehension requires metacognitive knowledge of reading strategies, which develops first in children, and control and regulation of these reading strategies, which develops later. Yen-Hui (2016) defined reading strategies as "…self-directed actions where readers flexibly take control with a certain degree of awareness to retrieve, store, regulate, elaborate, and evaluate textual information to achieve reading goals" (p. 1790). Yen-Hui (2016) further stated the effective use of reading strategies by students is enhanced by metacognitive awareness. Reid et al. (2017) defined metacognitive strategies as those "…activated to gauge progress towards cognitive goals" (p. 31).

Metacognitive knowledge of reading strategy use is consistently related to reading comprehension scores (Kolić-Vehovec et al., 2014). Grade level has been found to have significant effects on metacognitive reading strategy knowledge, as studies show it continues to develop throughout high school (Kolić-Vehovec et al., 2014). An enhanced metacognitive awareness and understanding at the secondary level of reading strategies and the skillful application of these strategies result in better text comprehension (Kolić-Vehovec et al., 2014).

Afflerbach's (2016) analysis of the historical research of individual differences in reading included a discussion of the affective systems that support cognition, such as

motivation, engagement, and self-efficacy. Afflerbach (2016) found, "Metacognition interacts with affect in reading, as readers build understanding not only of their cognitive operations, but also of their emotional states before, during, and after reading" (p. 4). Veenman (2016) distinguished between the cognitive and the metacognitive skills associated with reading. Reid et al. (2017) defined cognitive strategy as "…the mental procedure used by a learner to assimilate and retain new information and knowledge, which is then translated into performance" (p. 30). Lower-order cognitive processes taking place during reading include decoding, analyzing, and lexical access, as well as the more complex skills of relating, comparing, and making inferences (Veenman, 2016). Yen-Hui (2016) categorized these processes as bottom-up and top-down skills, with the lower-order skills falling into the category of bottom-up and the complex skills into the category of top-down. Reid et al. (2017) placed the sub-category of generative strategies within the realm of cognitive strategies and defined them as learning activities that create meaning or relationships among the information in the text, such as summarizing, paraphrasing, predicting, and creating mnemonic devices.

The metacognitive higher-order processes of planning and evaluation are what govern the lower-level cognitive processes (Veenman, 2016). According to Reid et al. (2017), "The relationship between cognitive and metacognitive strategy use is codependent; cognitive strategies are activated to make cognitive progress, and metacognitive strategies monitor this progress" (p. 31). In order to check the outcome of a solution to a problem; plan a next move; monitor the effectiveness of an action; and test, revise, and evaluate learning strategies, all of which are metacognitive in nature, the reader must have knowledge of cognitive resources, awareness of cognitive processing,

and the ability to adjust learning strategies (Yen-Hui, 2016). Reid et al. (2017) asserted readers' lack of ability to accurately gauge their understanding of text while reading leads to a failure in recognizing a lapse in understanding the content; this, in turn, leads to a failure in activating both cognitive and metacognitive strategies. This judgment of understanding while reading is called metacomprehension accuracy and is mastered by highly self-regulated learners (Reid et al., 2017).

Marzano (2017) is a proponent of the explicit teaching of both cognitive and metacognitive skills, defining metacognitive skills as "…those that allow us to exert executive control over the complex tasks in which we engage" (p. 112). Marzano's (2017) list of specific metacognitive behaviors includes the following: planning for goals and making adjustments; staying focused when solutions are not immediately apparent; pushing the limits of one's knowledge and skills; generating and pursuing self-imposed standards of excellence; seeking incremental steps; seeking accuracy; seeking clarity; resisting impulsivity; and seeking cohesion and coherence. Marzano (2017) suggested a scope and sequence for the embedding of the explicit teaching of metacognitive skills in content areas K-12.

Veenman (2016) separated metacognition into two distinct areas: metacognitive declarative knowledge about one's cognitive system and metacognitive skills for regulating cognitive processes. Kostons and Werf (2015) transferred the importance of prior knowledge of content to metacognitive strategies, finding strategic processing of texts can also be prior knowledge. Although Veenman (2016) cited studies revealing metacognitive skillfulness accounts for 40% of learning outcomes, he also contended when using this strategy with students, an awareness of the fact metacognitive knowledge

may be underestimated or overestimated by the learner is necessary. This flawed self-knowledge may lead to resistance to change, and is hence a poor predictor of learning outcomes (Veenman, 2016).

Hong-Nam et al. (2014) differentiated between the conscious use of reading strategies and metacognitive strategies. The explicit teaching of reading strategies and student awareness of them is a precursor to use of metacognitive strategies; as students use metacognitive strategies to monitor their progress, they choose reading strategies from their repertoire to improve their learning process and outcomes (Hong-Nam et al., 2014). This awareness of the learning processes and one's control over them are sometimes labeled meta-learning or meta-strategic knowledge (Ritchhart et al., 2011). Research by Hong-Nam et al. (2014) on metacognitive use by adolescents revealed, "Participants with high reading comprehension test scores reported significantly higher metacognitive strategy use than did students with low scores," especially as text reading levels become more difficult (p. 765). Yen-Hui (2016) similarly established the difference in good and poor comprehension "…lay in the total number of identified strategies that were used successfully while reading a text and while taking a reading test" (p. 1792).

One component of metacognitive knowledge is conditional knowledge of when a particular metacognitive strategy should be applied and to what purpose (Veenman, 2016). Hong-Nam et al. (2014) promoted explicit teaching of these strategies and beginning the process by building an awareness that metacognition exists, that it is different from cognition, and that it can increase academic success. Poor readers struggle in this area, because they cannot determine what strategy should be applied, when to

apply it, or why they should use it (Veenman, 2016). Veenman (2016) asserted in order for metacognitive strategies and skills to be built, conditional knowledge is a prerequisite.

Fisher et al. (2016) described metacognitive awareness as vital to the learning process and specifically to literacy skills. However, this ability requires guidance to develop in students the capacity to plan tasks, monitor comprehension, and evaluate their own progress. Veenman (2016) specified orientation and planning on the part of the student when approaching a text as a key element of activating metacognitive strategies. Attention to prior knowledge and the physical elements of the text, such as titles, subheadings, paragraph structure, and length, are all requirements of this element (Veenman, 2016). Attention to reading goals and specifying what kind of information is relevant to the purpose of the reading, such as test preparation, are also part of the metacognitive strategies activated at this stage (Veenman, 2016).

During the act of reading, the invisible differences in the metacognitive processes become important and are apparent in the visible measures of reading comprehension after the act (Veenman, 2016). Metacognitively proficient readers self-monitor and take actions to remedy lack of understanding, while students with poor monitoring skills either do not detect their miscomprehension or do not take action to resolve the problem (Veenman, 2016). The skills of close reading, paraphrasing, generating self-questions, drawing conclusions, and making inferences are marks of the metacognitively proficient student (Veenman, 2016). After the act of reading, the ability to evaluate comprehension of the text against reading goals is also the mark of the student who is proficient in the use of metacognitive strategies (Veenman, 2016). The execution of metacognitive strategies and skills before, during, and after reading is not a linear process; rather, it is

cyclical, with parts of it being inserted or repeated during the act by a metacognitively proficient reader (Veenman, 2016).

Teaching students metacognitive thinking skills and the ability to self-regulate allows students to consolidate their deep learning and make sense of complex texts (Fisher et al., 2016). The ability to think metacognitively begins as early as age three and continues to develop into adulthood and is further enhanced by feedback that enlightens students when strategies work and when they do not (Fisher et al., 2016). Questioning strategies of teachers can be particularly valuable when fostering metacognitive skills; asking questions about current understanding can play an important role in helping students monitor their reading comprehension as well as assisting the teacher in making instructional decisions about the impact of instruction (Fisher et al., 2016).

In the area of vocabulary development, Kieffer and Stahl (2016) found metacognition likely to be involved in vocabulary development. A subset of metacognition, metalinguistic awareness, or the ability to reflect on and manipulate the structural features of spoken and written language, may be essential to learning new word meanings (Kieffer & Stahl, 2016). Evidence suggests using features of metalinguistic awareness during instruction that explicitly teaches word-learning strategies can enhance learning in the area of vocabulary (Kieffer & Stahl, 2016).

Assessing metacognitive processes poses a problem since they are invisible and the student must be relied upon to accurately self-report (Mokhtari & Reichard, 2002). Self-report instruments such as questionnaires, also referred to as offline methods, suffer from validity problems due to the fact students have to consult their memories and reconstruct earlier processes (Veenman, 2016). Online measures have been shown to

have higher correlation, and the relatively recent use of computers while reading makes the act of using metacognitive strategies, such as annotation, highlighting text, and marking links throughout reading, visible to the instructor (Veenman, 2016).

Veenman (2016) promoted the explicit instruction and training of poor readers to develop metacognitive strategies using three instructional strategies. Embedded instruction allows metacognitive instruction to be integrated within the context of a reading task (Veenman, 2016). Informed instruction requires the student to be informed of the benefit of applying metacognitive skills in order to encourage students to apply the extra effort required by the learning of these skills (Veenman, 2016). Prolonged training aims at the sustained application of these metacognitive skills (Veenman, 2016).

Feedback

Fisher et al. (2016) asserted metacognitive skills are inherently linked to feedback. According to Fisher et al. (2016), "Metacognitive and self-regulatory skills of students are strengthened through feedback from the teacher. When the feedback is delivered such that it is timely, specific, understandable, and actionable, students assimilate the language used by the teacher into their own self-talk" (p. 100). Marzano (2017) defined feedback as "…the information loop between the teacher and the students that provides students with an awareness of what they should be learning and how they are doing" (p. 6). Fisher et al. (2016) discovered feedback from teachers and peers provides learners with information they need to move toward success; the effect size for feedback is 0.75. Marzano (2017) included student understanding of how test scores and grades relate to status on the progression of knowledge they are expected to master as an important element of feedback. Kallick and Zmuda (2017), when providing instruction

on feedback, encouraged teachers to coach students to think about content of problems by crafting good questions that lead the way as opposed to instructing them on how to solve the problems. Ritchhart et al. (2011) suggested questioning techniques help students construct understanding and facilitate the illumination of students' own thinking to themselves.

Hattie and Yates (2014) found appropriate feedback to be empowering for students. The ability of the student to move forward, plan, adjust, and exercise self-regulation in realistic ways lends itself to the desired effect of student engagement (Hattie & Yates, 2014). However, negative effects have been found when feedback is too long, complex, or non-specific (Hooley & Thorpe, 2017). In order for feedback to be useful, it must address four dimensions (Fisher et al., 2016; Kallick & Zmuda, 2017). Feedback must be timely, specific, understandable, and actionable in order to be of the most benefit to the learner (Fisher et al., 2016; Kallick & Zmuda, 2017). Researchers disagree on the timing of feedback; some researchers have supported immediate feedback to prevent retention of incorrect responses, while others asserted quick feedback interferes with processing and transference of learning (Hooley & Thorpe, 2017). Hooley and Thorpe (2017) reported timing of feedback serves different purposes depending upon when it occurs in the learning process. Feedback prior to learning can give students assurance the work is meaningful; feedback during an assessment can validate student understanding; and feedback post-test supports student efforts and encourages confidence and self-direction (Hooley & Thorpe, 2017).

However, the quality of the feedback offered is not the only item of importance when considering this topic. Fisher et al. (2016) stated the challenge level of the task

about which the feedback is being given is also significant. Students are more likely to respond to feedback when engaged in challenging tasks due to their need for input to maintain growth and learning (Fisher et al., 2016); however, a balance must be struck between challenge and frustration (Kallick & Zmuda, 2017). The teacher must also be sensitive to student goals and stages of intellectual and emotional development (Kallick & Zmuda, 2017). Kallick and Zmuda (2017) found when the person providing constructive feedback is credible to the student, the student becomes more persistent in trying new things.

Learning through feedback should not be considered a finite, linear process, but an "expanding and iterative process" (Kallick & Zmuda, 2017, p. 106). Learners receiving feedback should cycle through the steps of clarifying goals and purpose; planning; taking action and experimenting; assessing and gathering evidence; studying, reflecting, and evaluating; modifying actions based on new knowledge; then revisiting and clarifying goals again (Kallick & Zmuda, 2017). Kallick and Zmuda (2017) promoted one-on-one conferencing, separate from the workspace of other students, early in the year, as well as keeping the conference learner-centered as the most effective means of providing feedback. Feedback may also be delivered and received virtually through digital tools such as video conferencing, audio commentary, and written commentary (Kallick & Zmuda, 2017).

Actively Learn

Actively Learn is a digital reading platform that allows teachers access to the website's existing content or to upload texts for student access (Actively Learn, 2017). Teachers can embed questions within the text at any point, allowing formative

assessment throughout the reading process of the literal and inferential understanding of the student (Actively Learn, 2017). This can be particularly important to help students overcome deficits in prior knowledge by embedding a pre-test or a discussion to determine where each student is in his or her content knowledge (Actively Learn, 2017). Reid et al. (2017), in a study of the effects of embedded cognitive and metacognitive prompts in the digital reading material of college undergraduates, found a combination of these strategies significantly improves metacomprehension and enhances learner achievement. Embedded prompts serve to activate generative cognitive strategies; furthermore, integration of metacognitive support directly into the text focuses readers' attention on the quality and effectiveness of their own cognitive processes (Reid et al., 2017).

In addition to embedded material, sidebar discussions can also be allowed in Actively Learn (2017), and links to other media or sites can be embedded as notes. Students can highlight words for definitions to be provided within the platform, assisting with vocabulary acquisition, and they can use text-to-voice features and translation to other languages if these are barriers to comprehension (Actively Learn, 2017). To provide insight into the thought processes of students as they read and to encourage metacognitive strategies, the platform allows the teacher to see students' answers, annotations, and discussions in real time and to provide immediate feedback to individual students (Actively Learn, 2017). Lemov et al. (2016) found interactive reading on the part of students to be effective in student engagement with and making sense of texts.

Reports available include information on how long each student spent reading a text, how many words were looked up, how many words the student wrote in response to

questions, and the scores given on questions by the teacher (Actively Learn, 2017). The platform has a free version; a version at minimal cost to an individual teacher that includes additional free texts, paid texts, and basic reports; a higher-cost version for individual teachers that includes full reporting capabilities; and a per-student version for all teachers within a building to use (Actively Learn, 2017).

Summary

The need for interventions to improve the ability to read and comprehend complex texts at the secondary level is apparent in the flat line that represents reading scores for high school students since 1971 (National Center for Educational Statistics, 2017). However, in order to improve in this area, all educators must understand the teaching and learning of discrete areas that constitute foundational and advanced reading skills, as well as best practices in the content area and pedagogy. Hattie's (2012) meta-analysis of research-based educational interventions allows teachers to choose teaching strategies with a high effect size, such as metacognition and feedback, which have the potential to increase students' reading skills at the secondary level. The increasing use of technology available to students and teachers gives educators access to texts and tools that can maximize the use of these strategies.

In the subsequent chapter, the methodology used for this study is discussed. The research questions are restated, and the rationale for a quantitative study is presented. The research methodology and design are detailed, as is the instrumentation. The reliability and validity of the two instruments used as measures in this study are discussed. The population and participants are specified, as well as the data collection

and analysis procedures. Ethical considerations are also discussed, providing a clear overview of this study.

Chapter Three: Methodology

Improving reading scores at the secondary level continues to be an ongoing struggle (National Center for Educational Statistics, 2017). Public education in the United States has made no significant progress in this area in decades, regardless of the remarkable progress in research-based effective teaching strategies in the same period (National Center for Educational Statistics, 2017). However, it is imperative research continues in this area. Furman (2015) stated, "It is no longer acceptable to assume that a student's strength in the sciences or in math can make up for his or her lack of skill in language arts" (p. 4).

In today's technology-driven world, to be a subject-area expert requires reading skills to build foundational knowledge (Furman, 2015). To gain recognition as a subject-area expert requires what Furman (2015) called social currency, defined as the act of sharing information to encourage future encounters. Furman (2015) asserted the highest form of reading occurs in students, not when they have read the material, but when they can evaluate and articulate the reading. This study was conducted to ascertain whether using a platform that combines the research-based instructional strategies of metacognition and feedback could improve the reading engagement, reading comprehension, and vocabulary of secondary students in the public-school setting.

This chapter includes an overview of the problem and purpose of this study, as well as the research questions and hypotheses. The methods for this study involved a pre-test using the MARSI and the STAR; the application of the independent variable, Actively Learn, with an emphasis on metacognitive skills and feedback; and a post-test using the MARSI and the STAR to see if the independent variable had an effect on the

scores. Data analysis included use of a paired-sample *t*-test to determine the difference between the means of pre- and post-test scores of students before and after the application of the independent variable. The analysis also included an independent *t*-test to compare differences in scores of students in previous years to the scores of students who had the independent variable applied. The research questions lend themselves to an examination of quantifiable skills.

Problem and Purpose Overview

Research was conducted for this study to determine if there was a difference in student scores in reading engagement, reading comprehension, and vocabulary prior to and after using the reading platform Actively Learn. Significant progress in reading skills at the secondary level has remained difficult to attain for decades (National Center for Educational Statistics, 2017). However, the importance of literacy skills continues to increase as the economic base of the future moves from manufacturing to the ability to network and use technological tools (Furman, 2015). Regardless of the need for secondary reading improvement, Ness (2016), in a mixed-methods study of middle and high school content areas, found only 3% of instructional time was devoted to the explicit teaching of reading comprehension strategies in middle school, and no time was devoted in high school. Secondary teachers cite lack of instructional time and pressure to cover content as barriers to literacy instruction (Ness, 2016).

This leaves the primary teaching of reading comprehension strategies to English language arts teachers (Missouri Department of Elementary and Secondary Education [MODESE], 2016). The latest iteration of the Missouri Learning Standards, unlike its immediate predecessor, includes literacy standards only in the area of English language

arts (MODESE, 2016). The problem for secondary teachers becomes how to incorporate explicit reading strategies into content-area curriculum without the perception teachers are sacrificing content-area instruction.

Research questions and hypotheses. The following research questions and hypotheses guided the study:

1. What is the difference between perceptions of levels of reading engagement for high school seniors prior to using Actively Learn to interact with texts electronically versus their perceptions after using Actively Learn, as measured by the Metacognitive Awareness of Reading Strategies Inventory (MARSI)?

$H1_0$: There is no statistically significant difference between perceptions of levels of reading engagement for high school seniors prior to using Actively Learn to interact with texts electronically versus their perceptions after using Actively Learn, as measured by the Metacognitive Awareness of Reading Strategies Inventory (MARSI).

2. What is the difference in high school seniors' reading comprehension scores on the Standardized Test for the Assessment of Reading (STAR) after using Actively Learn to engage with texts as compared to their scores prior to using Actively Learn?

$H2_0$: There is no statistically significant difference in high school seniors' reading comprehension scores on the Standardized Test for the Assessment of Reading (STAR) after using Actively Learn to engage with texts as compared to their scores prior to using Actively Learn.

3. What is the difference in high school seniors' vocabulary scores on the Standardized Test for the Assessment of Reading (STAR) after using Actively Learn to engage with texts as compared to their scores prior to using Actively Learn?

$H3_0$: There is no statistically significant difference in high school seniors' vocabulary scores on the Standardized Test for the Assessment of Reading (STAR) after using Actively Learn to engage with texts as compared to their scores prior to using Actively Learn.

4. What is the difference in the change in reading comprehension and vocabulary scores between the first and second administration of the Standardized Test for the Assessment of Reading (STAR) during their senior year for students in one Missouri school district during the 2017-2018 school year after using Actively Learn as compared to the change in scores between the first and second administration of the STAR for seniors during the 2013-2014, 2014-2015, 2015-2016, and 2016-2017 school years who did not use Actively Learn?

$H4_0$: There is no statistically significant difference in the change in reading comprehension and vocabulary scores between the first and second administration of the Standardized Test for the Assessment of Reading (STAR) during their senior year for students in one Missouri school district during the 2017-2018 school year after using Actively Learn as compared to the change in scores between the first and second administration of the STAR for seniors during the 2013-2014, 2014-2015, 2015-2016, and 2016-2017 school years who did not use Actively Learn.

Research Design

The researcher conducted a causal-comparative quantitative study of data from the MARSI and the STAR, both administered prior to introducing the independent variable of the use of Actively Learn and again subsequent to its use. Data were analyzed using a *t*-test to determine the difference between the means of pre-test and post-test scores (Bluman, 2013). Since data from both the MARSI and the STAR are expressed in numerical form, and since the validity and reliability of both existing instruments were already established, a quantitative study was conducted to ensure data collection was standardized. Although Fraenkel et al. (2015) found causal-comparative studies likely to provide weaker evidence for causation than experimental studies, due to ethical constraints, the causal-comparative study was determined to be the least likely to cause harm to any part of the population. Fraenkel et al. (2015) also stressed a major threat to internal validity in a causal-comparative study is a subject characteristics threat; that threat was eliminated in this study by the use of census data of the entire population.

The archival data available to the primary investigator had established validity and reliability. The use of quantitative research techniques was valuable, because generalizations could be established, thus making the research valuable beyond the studied population (Fraenkel et al., 2015). However, since averages were used, Bluman (2013) warned the results cannot be generalized to individuals, since averaging "tends to smooth out the variability among individual data values" (p. 536). Quantitative methods combined with the use of census data also helped to eliminate the possibility of bias on the part of the primary investigator (Fraenkel et al., 2015).

The *t*-test was used to determine the significance of the difference in means. However, Bluman (2013) warned a high correlation between variables does not guarantee a cause-effect relationship. Particularly with quantitative studies in which limited variables are taken into consideration, there is always the possibility a third lurking variable is the cause of the correlation (Bluman, 2013; Fraenkel et al., 2015).

Population and Sample

Data for this study were collected using a census of all seniors enrolled in required senior English courses in School District A. School District A is a rural Missouri district with approximately 1,500 students. Senior English is a required course for all students except those who are in the self-contained special education classroom and those who attend the alternative school; these two exceptions comprise less than 10% of the cohort. The remaining 76 students who were present for both the MARSI and the STAR pre- and post-tests all participated in the study, which was based upon archival data collected as part of the course curriculum.

Fraenkel et al. (2015) stated, "Drawing conclusions about a population after studying a sample is never totally satisfactory, since researchers can never be sure that their sample is perfectly representative of the population" (p. 103). The researcher's access to the entire population and the fact the size of the population was manageable for a study of this type were factors that led the researcher to conduct a census study (Fraenkel et al., 2015). Fraenkel et al. (2015) recommended a minimum of 30 individuals per group for a causal-comparative study, a number which was easily attainable with this population. The use of a census study also eliminated the need for stratified sampling to compensate for differences in number in gender, special education students, and any

other student populations that may have affected the data (Creswell, 2014; Fraenkel et al., 2015).

Instrumentation

Metacognitive Awareness of Reading Strategies Inventory (MARSI). The intentions of the researchers who developed the MARSI were to:

> …devise an instrument that would permit one to assess the degree to which a student is or is not aware of the various processes involved in reading and to make it possible to learn about the goals and intentions he or she holds when coping with academic reading tasks. (Mokhtari & Reichard, 2002, p. 251)

Results optimally can be used for enhancing assessment, planning instruction, or conducting classroom or clinical research (Mokhtari & Reichard, 2002). The MARSI enables students to increase awareness of their own reading strategies; provides teachers with a useful means of assessing, monitoring, and documenting the type and number of reading strategies used by students; and serves as a tool for investigating the impact of teaching strategic reading on students' reading comprehension (Mokhtari & Reichard, 2002). Reliability of the instrument was reported as .89, and researchers reported construct validity was reflected in their data (Mokhtari & Reichard, 2002).

When using the MARSI, students score themselves on a Likert scale of one to five (Mokhtari & Reichard, 2002). One indicates "I never or almost never do this;" two indicates "I do this only occasionally;" three indicates "I sometimes do this (about 50% of the time);" four indicates "I usually do this;" and five indicates "I always or almost always do this" (Mokhtari & Reichard, 2002, p. 90). Student scores are grouped into three categories: global reading strategies, problem-solving strategies, and support

reading strategies (Mokhtari & Reichard, 2002). Global reading strategies are those designed to intentionally and carefully manage and monitor interactions with the text (Mokhtari & Reichard, 2002). Problem-solving strategies are used for solving problems of understanding that arise during a reading of a text (Mokhtari & Reichard, 2002). Support reading strategies are basic mechanisms used to aid comprehension, such as annotation (Mokhtari & Reichard, 2002). These subsets of scores are averaged, as well as incorporated into the overall score, and a scale is provided to show whether scores fall into the high, medium, or low categories (Mokhtari & Reichard, 2002).

Standardized Test for the Assessment of Reading (STAR). The STAR test is a formative assessment taken electronically by students in a multiple-choice format (Renaissance Learning, 2015). The STAR was designed to measure progress toward reading skills goals and to inform instruction (Renaissance Learning, 2015). It was designed so it can frequently be administered throughout the year (Renaissance Learning, 2015). The overall reliability coefficient is .97, and for grade 12, the population for this study, it is .95 (Renaissance Learning, 2015). The ongoing validity was measured against over 50 recognized, established measures of reading achievement in a variety of areas (Renaissance Learning, 2015).

The STAR test allows reporting of scores in the form of grade equivalents ranging from 0.0 to 12.9+ (Renaissance Learning, 2015). Achievement is measured in five domains, each with subsets of skills (Renaissance Learning, 2015). Skills can be measured in a variety of ways; however, for the purposes of this study, a domain score was used to measure overall reading comprehension, and a domain score which can range from 0-100 was used to measure vocabulary (Renaissance Learning, 2015).

Data Collection

In order to complete this study, the primary investigator first obtained informed consent from the superintendent of schools (see Appendix A) and the building principal (see Appendix B) of the district used in the study. Upon receipt of this consent, the primary investigator obtained consent to use the Metacognitive Awareness of Reading Strategies Inventory (MARSI) (see Appendix C) and the Standardized Test for the Assessment of Reading (STAR) (see Appendix D) for purposes of data collection for this study. The primary investigator then applied for and received approval from the Lindenwood University Institutional Review Board to conduct the study (see Appendix E).

The MARSI (see Appendix F) and the STAR were administered to all senior English students in School District A within the primary investigator's English classroom during the students' regularly scheduled English classes. Subsequently, the primary investigator implemented the online reading platform Actively Learn with students during their regularly scheduled English classes. At the end of the study, the MARSI and the STAR were re-administered to all senior English students in School District A within the researcher's English classroom during the students' regularly scheduled English classes.

Upon conclusion of the study, a third-party examiner de-identified data from the MARSI and the STAR pre- and post-tests using a coding system before granting the examiner access to the data. The primary investigator then analyzed census data from the MARSI and the STAR pre- and post-tests and assessed and compared data using a *t*-test.

The primary investigator used the data to determine if there was a statistically significant difference ($p \leq .05$) between the reading engagement scores as measured by the MARSI and reading comprehension and vocabulary scores as measured by the STAR of students prior to and after using Actively Learn.

The data allowed the researcher to formulate answers to the research questions posed concerning the use of Actively Learn and the impact it may or may not have had on reading engagement, reading comprehension, and vocabulary. The results were made available to stakeholders and can be used to inform district teachers and the company that developed Actively Learn as to the efficacy of this product.

Data Analysis

A *t*-test was utilized to determine the statistical significance of the data (Bluman, 2013). This facet of the study allowed the researcher to identify if a difference existed between the pre-test and post-test student data for the MARSI and the STAR. The paired-sample *t*-test applied to the data either revealed a statistically significant difference or no statistically significant difference. A significance level of ± .05 was determined and used to test the hypotheses and to answer the research questions. The same method was used to determine how the difference between the first and second STAR tests for the four previous years compared with the data generated during the course of the study.

The significance factor was applied to both the MARSI and the STAR pre- and post-test data. The research questions and hypotheses were tested after the careful analysis of data. Trends were examined based on the data analysis. Conclusions were drawn relative to the outcomes of the study, based on quantitative data analysis. These data were utilized to determine if a difference existed between the pre-test and post-test

data after the application of the independent variable. The data were organized into tables and charts in order to provide a clear picture of the significance, or lack thereof, between the pre- and post-test data and the data from the duration of the study versus comparable STAR data from four previous years.

Ethical Considerations

To ensure confidentiality and anonymity, safeguards were used for the duration of and subsequent to the study. When discussing identifiable statistics of the school district used for the study, approximations and modifications were used. Data were collected by a third party, and all identifiers were removed. Since averages were used for data analysis purposes, individual student data were not exploited in the course of the study. There was no possibility of harm to the participants, since there was no experimental group and no rewards were attached to participation in the study.

All data were secured on a password-protected laptop accessible only to the primary investigator for the extent of the study. Removable backup of data was created and secured in a locked cabinet under the supervision of the primary investigator. All information was kept locked and secured during the course of the study and will be destroyed three years after completion of the study.

Summary

The purpose of this study was to determine if significant increases in the historically plateaued areas of reading engagement, reading comprehension, and vocabulary in secondary students could be attained following application of an independent variable. This study involved the investigation of the effect of the reading

platform Actively Learn on student reading engagement, as measured by the MARSI, and on reading comprehension and vocabulary skills, as measured by the STAR.

For three of the four research questions, a quantitative examination of pre- and post-test data was conducted on a census population of high school seniors prior to and after the administration of the independent variable Actively Learn. During the study, archival data were utilized, and student identifiers were removed from all data by a third party; individual student scores were not utilized. A *t*-test was used to determine if a statistical significance existed between the two sets of data. For the fourth research question, data from the first and second STAR tests administered during the four previous school years were used to compare the results of the current students to those of prior classes taught by the same instructor without application of the independent variable.

In Chapter Four, these data are analyzed and organized into tables. The results of the *t*-test for pre- and post-test MARSI and STAR data are reported and analyzed. The comparison of scores from four previous years' first and second STAR administrations to the pre- and post-test STAR administrations during the course of the study are also reported and analyzed.

Chapter Four: Analysis of Data

Introduction

The purpose of this study was to determine if the use of an online reading tool could increase reading achievement at the secondary level, a group which has historically shown no significant growth in this area for several decades (National Center for Educational Statistics, 2017). Quantitative archival data collected from a census of senior English students in one Missouri school district allowed the researcher to investigate if there was a difference in student reading engagement, reading comprehension, and vocabulary scores prior to and after the introduction of the online reading platform Actively Learn. The researcher used the MARSI to determine students' self-reported levels of reading engagement on assigned texts in the classroom setting and the STAR to determine reading comprehension and vocabulary scores prior to introducing Actively Learn. After using Actively Learn with students to complete assigned reading in the senior English classroom, the MARSI and the STAR were again administered to determine the difference between pre-test and post-test scores. The STAR scores from the first and second administrations of the test to four previous years' senior English students who did not use Actively Learn were also compared to the current year's scores to determine if the difference in scores was statistically significant.

The MARSI was chosen to measure student reading engagement based upon student self-reporting using a Likert scale of one to five to report the use of strategies in the categories of global reading strategies, problem-solving strategies, and support reading strategies (Mokhtari & Reichard, 2002). Scores are averaged and reported in each of these categories, as well as an overall engagement score, and the results are

categorized as high, medium, or low on the scale developed by the MARSI researchers (Mokhtari & Reichard, 2002). The reliability of this instrument is reported as .89 (Mokhtari & Reichard, 2002).

The STAR is designed to be administered as a formative assessment several times throughout a school year to measure growth in reading comprehension and vocabulary skills (Renaissance Learning, 2015). Students take an electronic assessment which consists of reading passages followed by multiple-choice questions (Renaissance Learning, 2015). Scores are reported in various formats, including scaled scores, domain scores, and grade-level equivalents (Renaissance Learning, 2015). For the purposes of this study, domain scores were used to report reading comprehension levels, and domain scores were used to report vocabulary levels. The reliability coefficient for students at the grade level used in this study is reported as .95 (Renaissance Learning, 2015).

Both the MARSI and the STAR were administered as part of the class curriculum and district testing requirements during the first month of the school year to all seniors enrolled in the required senior English class. The online reading platform Actively Learn was used subsequent to the first administration of the test by students who were completing required reading assignments for the class. Both tests were administered again at the end of the semester. Using the MARSI results, the researcher calculated the mean score for each of three sub-set categories and for overall reading engagement for the pre-test and the post-test. Pre-test and post-test scores were compared using a one-sample *t*-test to determine if the difference in the scores was statistically significant ($p \leq .05$). Using the STAR results, the researcher calculated the mean domain score for the pre-test and post-test for the current year's class. Pre-test and post-test scores were

compared using a one-sample *t*-test to determine if the difference in the scores was statistically significant ($p \leq .05$). Using four previous years of data, the researcher calculated the mean domain score for the first and second administrations of the STAR test for each year. The difference in the mean scores for each group was calculated, and a mean difference recorded and compared to the mean difference for the current year's scores using a two-sample *t*-test to determine if the difference in the scores was statistically significant ($p \leq .05$).

Research Question One

What is the difference between perceptions of levels of reading engagement for high school seniors prior to using Actively Learn to interact with texts electronically versus their perceptions after using Actively Learn, as measured by the Metacognitive Awareness of Reading Strategies Inventory (MARSI)?

$H1_0$: There is no statistically significant difference between perceptions of levels of reading engagement for high school seniors prior to using Actively Learn to interact with texts electronically versus their perceptions after using Actively Learn, as measured by the Metacognitive Awareness of Reading Strategies Inventory (MARSI).

A paired-sample *t*-test was conducted to compare pre-test and post-test MARSI scores for students after the introduction of the independent variable Actively Learn. As seen in Table 1 and Table 2, based on a *p*-value threshold of .05, there was a significant difference in student perceptions of Global Reading Strategies (GLOBAL) before and after using Actively Learn. This is evidenced in the pre-test GLOBAL1 ($M = 2.61$, $SD = .644$) and post-test GLOBAL2 scores ($M = 3.12$, $SD = .687$) with conditions; $t(75) = -8.373$, $p < .001$. These results suggest Actively Learn influences GLOBAL.

Specifically, the results suggest one semester of Actively Learn has significant impact on GLOBAL.

However, in the sub-score area of Support Reading Strategies (SUPPORT), as seen in Table 1 and Table 2, based on a *p*-value threshold of .05, there was no significant difference in the student perceptions of SUPPORT before and after using Actively Learn, as evidenced in the scores for pre-test SUPPORT1 ($M = 3.19$, $SD = .783$) and post-test SUPPORT2 scores ($M = 3.08$, $SD = 1.021$) with conditions; $t(75) = 1.209$, $p = .230$. These results suggest Actively Learn does not influence SUPPORT. Specifically, the results suggest one semester of Actively Learn has no significant impact on SUPPORT.

As seen in Table 1 and Table 2, based on a *p*-value threshold of .05, there was a significant difference in student perceptions of Problem-Solving Strategies (PROBSOLV) before and after using Actively Learn. The scores for pre-test PROBSOLV1 ($M = 2.19$, $SD = .572$) and post-test PROBSOLV2 scores ($M = 3.36$, $SD = .715$) with conditions; $t(75) = -16.945$, $p < .001$. These results suggest Actively Learn influences PROBSOLV. Specifically, the results suggest one semester of Actively Learn has a significant impact on PROBSOLV.

These three sub-scores combine for an overall MARSI score, reflected in TOTAL. As seen in Table 1 and Table 2, based on a *p*-value threshold of .05, there was a significant difference in overall student perceptions of their use of reading engagement strategies before and after using Actively Learn. The scores for pre-test TOTAL1 ($M = 2.66$, $SD = .599$) and post-test TOTAL2 scores ($M = 3.19$, $SD = .716$) with conditions; $t(75) = -10.205$, $p < .001$. These results suggest Actively Learn influences TOTAL.

Specifically, the results suggest one semester of Actively Learn has significant impact on TOTAL.

Table 1

Paired Samples Statistics for MARSI Scores before and after Actively Learn

		M	*N*	*SD*
Pair 1	GLOBAL1	2.61	76	.644
	GLOBAL2	3.12	76	.687
Pair 2	SUPPORT1	3.19	76	.783
	SUPPORT2	3.08	76	1.021
Pair 3	PROBSOLV1	2.19	76	.572
	PROBSOLV2	3.36	76	.715
Pair 4	TOTAL1	2.66	76	.599
	TOTAL2	3.19	76	.716

Note. Metacognitive Awareness of Reading Strategies Inventory (MARSI); Global Reading Strategies (GLOBAL); Support Reading Strategies (SUPPORT); Problem-Solving Strategies (PROBSOLV).

Table 2

Paired Samples t-test of Paired Differences for MARSI before and after Actively Learn

		t	*df*	*Sig. (2-tailed)*
Pair 1	GLOBAL1 – GLOBAL2	-8.373	75	.000
Pair 2	SUPPORT1 – SUPPORT2	1.209	75	.230
Pair 3	PROBSOLV1 – PROBSOLV2	-16.945	75	.000
Pair 4	TOTAL1 – TOTAL2	-10.205	75	.000

Note. Metacognitive Awareness of Reading Strategies Inventory (MARSI); Global Reading Strategies (GLOBAL); Support Reading Strategies (SUPPORT); Problem-Solving Strategies (PROBSOLV).

Research Question Two

What is the difference in high school seniors' reading comprehension scores on the Standardized Test for the Assessment of Reading (STAR) after using Actively Learn to engage with texts as compared to their scores prior to using Actively Learn?

$H2_0$: There is no statistically significant difference in high school seniors' reading comprehension scores on the Standardized Test for the Assessment of Reading (STAR) after using Actively Learn to engage with texts as compared to their scores prior to using Actively Learn.

A paired-sample *t*-test was conducted to compare pre-test and post-test STAR domain scores in reading comprehension for students prior to and after the introduction of the independent variable Actively Learn. As seen in Table 3 and Table 4, based on a *p*-value threshold of .05, there was not a significant difference in the scores for pre-test (M = 61.72, SD = 19.976) and post-test STAR domain scores (M = 61.95, SD = 20.163) with conditions; $t(75) = -.195$, $p = .846$. These results suggest Actively Learn does not influence reading comprehension. Specifically, the results suggest one semester of Actively Learn does not have a significant impact on reading comprehension.

Table 3

Paired Samples Statistics for STAR Reading Comprehension

	M	*N*	*SD*
Comprehension before Actively Learn	61.71	76	19.976
Comprehension after Actively Learn	61.95	76	20.163

Table 4

Paired Samples t-test of Paired Differences for STAR Reading Comprehension

	t	*df*	*Sig. (2-tailed)*
Comprehension before Actively Learn Comprehension after Actively Learn	-.195	75	.846

Research Question Three

What is the difference in high school seniors' vocabulary scores on the Standardized Test for the Assessment of Reading (STAR) after using Actively Learn to engage with texts as compared to their scores prior to using Actively Learn?

$H3_0$: There is no statistically significant difference in high school seniors' vocabulary scores on the Standardized Test for the Assessment of Reading (STAR) after using Actively Learn to engage with texts as compared to their scores prior to using Actively Learn.

A paired-sample *t*-test was conducted to compare pre-test and post-test STAR domain scores in vocabulary for students prior to and after the introduction of the independent variable Actively Learn. Based on a *p*-value threshold of 0.05, there was not a statistically significant difference between pre-test and post-test STAR vocabulary scores. As seen in Table 5 and Table 6, there was not a significant difference in the scores for pre-test (M = 59.16, SD = 20.147) and post-test STAR domain scores (M = 60.00, SD = 20.125) with conditions; $t(75)$=-.709, p = .480. These results suggest Actively Learn does not improve vocabulary. Specifically, the results suggest one semester of Actively Learn does not have a significant impact on vocabulary improvement.

Table 5

Paired Samples Statistics for STAR Vocabulary

	M	*N*	*SD*
Vocabulary before Actively Learn	59.16	76	20.147
Vocabulary after Actively Learn	60.00	76	20.125

Table 6

Paired Samples t-test of Paired Differences for STAR Vocabulary

	t	*df*	*Sig. (2-tailed)*
Vocabulary before Actively Learn Vocabulary after Actively Learn	-.709	75	.480

Research Question Four

What is the difference in the change in reading comprehension and vocabulary scores between the first and second administration of the Standardized Test for the Assessment of Reading (STAR) during their senior year for students in one Missouri school district during the 2017-2018 school year after using Actively Learn as compared to the change in scores between the first and second administration of the STAR for seniors during the 2013-2014, 2014-2015, 2015-2016, and 2016-2017 school years who did not use Actively Learn?

$H4_0$: There is no statistically significant difference in the change in reading comprehension and vocabulary scores between the first and second administration of the Standardized Test for the Assessment of Reading (STAR) during their senior year for students in one Missouri school district during the 2017-2018 school year after using

Actively Learn as compared to the change in scores between the first and second administration of the STAR for seniors during the 2013-2014, 2014-2015, 2015-2016, and 2016-2017 school years who did not use Actively Learn.

An independent *t*-test was conducted to compare the change in scaled scores from the first and second administration of the STAR for seniors during the 2013-2014, 2014-2015, 2015-2016, and 2016-2017 school years who did not use Actively Learn and the change in scaled scores from the first and second administration of the STAR for seniors during the 2017-2018 school year prior to and after using Actively Learn. The two-tailed *p*-value was calculated to determine whether a significant difference exists in STAR reading comprehension scores from the first and second administration of Actively Learn for students who used Actively Learn versus those who did not (see Table 7). The *t*-test revealed the *p*-value equals .1822. By conventional criteria, this difference is not considered to be statistically significant. Based on a *p*-value threshold of 0.05, there was not a statistically significant difference in the STAR reading comprehension scores of students who used Actively Learn and those who did not.

The two-tailed *p*-value was calculated to determine whether a significant difference exists in STAR vocabulary scores from the first and second administration of the STAR for students who used Actively Learn versus those who did not (see Table 8). The *t*-test revealed the *p*-value equals .1671. By conventional criteria, this difference is not considered to be statistically significant. Based on a *p*-value threshold of 0.05, there was not a statistically significant difference in the STAR vocabulary scores of students who used Actively Learn and those who did not.

Table 7

Independent t-test between RC Scores of Students with & without Actively Learn

	t	*df*	*p*	*SD*
Student RC Scores with Actively Learn	1.7292	3	0.1822	0.844
Student RC Scores without Actively Learn				

Note. RC = Reading Comprehension.

Table 8

Independent t-test between Vocab Scores of Students with & without Actively Learn

	t	*df*	*p*	*SD*
Student Vocab Scores with Actively Learn	0.8977	3	0.4355	1.064
Student Vocab Scores w/out Actively Learn				

Summary

In this study, data results provided information as to the effectiveness of using Actively Learn to improve student engagement, reading comprehension, and vocabulary at the secondary level. A paired-sample *t*-test was used to compare pre-test and post-test scores from the MARSI and the STAR of students who used Actively Learn in their required senior English course to determine if there was a significant change. An independent two-sample *t*-test was used to compare the change in scores of seniors who used Actively Learn to the change in scores of four previous years of students who did not use Actively Learn.

From the analyses of student data on the MARSI, the use of Actively Learn leading to student perceptions of increased reading engagement among high school

seniors was statistically significant between the pre-test scores and the post-test scores for question one; therefore, the null hypothesis for question one was rejected (Creswell, 2014; Fraenkel et al., 2015). Results indicated a statistically significant difference in pre-test and post-test sub-scores in Global Strategies and Problem-Solving Strategies. Although no statistically significant difference in pre-test and post-test sub-scores in Support Reading Strategies was noted, all inventory items were combined for overall pre- and post-test MARSI scores, and a statistically significant difference in these scores was indicated.

However, the analyses of student data on the STAR, both in the areas of reading comprehension and vocabulary, reflected no statistically significant difference in pre-test and post-test scores in either area. As a result, the null hypotheses for questions two and three were not rejected (Creswell, 2014; Fraenkel et al., 2015). A comparison of the change in scores between the first and second administration of the STAR for students in the primary investigator's senior English course during the 2013-2014, 2014-2015, 2015-2016, and 2016-2017 school years, when Actively Learn was not used, to the 2017-2018 school year, when Actively Learn was used, reflects no statistically significant difference in pre-test and post-test scores in the areas of reading comprehension or vocabulary between the groups. As a result, the null hypothesis for question four is not rejected.

Chapter Five contains a summary of findings related to literature, as well as a summary of findings of the study not directly related to the research questions. Also presented are limitations of the findings, conclusions, and recommendations for further research on reading improvement at the secondary level.

Chapter Five: Summary and Conclusions

The purpose of this study was to provide data to determine if the use of the reading platform Actively Learn has a significant impact on student reading engagement, reading comprehension, and vocabulary for high school seniors. The study was completed through the analysis of data of pre- and post-test scores on the MARSI and the STAR prior to and after administration of the independent variable Actively Learn. The findings relative to the questions posed in this study are discussed in detail in this chapter, and pertinent information gathered through the completion of this study is addressed. Conclusions drawn from the completion of this study are analyzed, and recommendations and implications for future research are identified and discussed.

Findings

Students in a required senior English course were administered the MARSI and the STAR during the first two weeks of the school year. The resulting data were used as pre-test data for the purposes of this study. During the first semester of the course, all students were required to use the reading platform Actively Learn to read various required texts. The instructor embedded questions spanning various depths of knowledge within the texts and provided feedback to students as they responded as to their level of demonstrated understanding of the texts. This feedback consisted of a numerical score from zero to four, with four reflecting advanced understanding, three reflecting proficient understanding, two reflecting basic understanding, and zero reflecting an incorrect or incomplete answer. The instructor could also provide written feedback and allow the student to try again. Students spent an average of 17 hours and 45 minutes on Actively Learn, with the time spent per student ranging from a low of five hours and 42 minutes to

a high of 50 hours and 50 minutes. At the end of the semester, the MARSI and the STAR were re-administered; these data were used as post-test data for the purposes of this study. The researcher examined the following research questions to determine the effectiveness of Actively Learn on student reading engagement, reading comprehension, and vocabulary.

Research question one. What is the difference between perceptions of levels of reading engagement for high school seniors prior to using Actively Learn to interact with texts electronically versus their perceptions after using Actively Learn, as measured by the Metacognitive Awareness of Reading Strategies Inventory (MARSI)?

The 30 questions on the MARSI are each categorized into one of three sub-score areas: Global Reading Strategies, Support Reading Strategies, and Problem-Solving Strategies (Mokhtari & Reichard, 2002). Students answered questions about their reading engagement behaviors while reading assigned instructional materials on a scale of one to five, ranging from one indicating they never engage in the behavior to five indicating they always engage in the behavior (Mokhtari & Reichard, 2002). Data from all sub-categories were analyzed separately, then combined and analyzed as the overall MARSI score (Mokhtari & Reichard, 2002).

Global reading strategies were defined by Mokhtari and Reichard (2002) as those that allow the reader to set the purpose for reading, activate prior knowledge, determine whether the content fits the purpose, predict and confirm predictions, preview the text for content, skim to note text characteristics, and make decisions as to what to read closely based upon context clues and text structure, as well as use other textual features to assist in comprehension. Of the 30 total questions on the MARSI, 13 were categorized as

measuring the use of Global Reading Strategies. Based on the analysis of data from pre-test and post-test scores, there was a significant difference in student perceptions of their use of Global Reading Strategies before and after using Actively Learn. The mean on the pre-test was 2.61 (*SD* = .644), and the mean on the post-test was 3.12 (*SD* = .687). A significant increase from pre-test to post-test was found ($t(75) = -8.373$, $p < .001$). These results suggest one semester of Actively Learn has a significant impact on students' perceptions of their use of Global Reading Strategies.

The sub-category of Support Reading Strategies includes activities such as taking notes, paraphrasing, writing summaries, revisiting previously read information, asking self-questions, using reference materials as aids, underlining, and discussing the reading with others (Mokhtari & Reichard, 2002). Nine of the MARSI's 30 items are categorized as measuring Support Reading Strategies (Mokhtari & Reichard, 2002). Based on the analysis of data from pre-test and post-test scores, there was no significant difference in student perceptions of their use of Support Reading Strategies before and after using Actively Learn. The mean on the pre-test was 3.19 (*SD* = .783), and the mean on the post-test was 3.08 (*SD* = 1.021). A decrease in the mean from pre-test to post-test was found ($t(75) = 1.209$, $p = .230$). These results suggest one semester of Actively Learn has no significant impact on students' perceptions of their use of Support Reading Strategies.

Problem-Solving Strategies include the reader's ability to adjust the reading rate, read slowly and carefully, pay close attention to and pause to reflect on the reading, reread, visualize the information read, read out loud, and guess the meaning of unknown words (Mokhtari & Reichard, 2002). The MARSI includes eight questions that measure

the use of Problem-Solving Strategies (Mokhtari & Reichard, 2002). Based on the analysis of data from pre-test and post-test scores, there was a significant difference in student perceptions of their use of Problem-Solving Strategies before and after using Actively Learn. The mean on the pre-test was 2.19 (*SD* = .572), and the mean on the post-test was 3.36 (*SD* = .715). A significant increase from pre-test to post-test was found ($t(75) = -16.945$, $p < .001$). These results suggest one semester of Actively Learn has a significant impact on students' perceptions of their use of Problem-Solving Strategies.

Although the analyses of data of the three sub-categories included in the MARSI reflect inconsistent findings, the combined data of all questions reflect a significant difference in overall student perceptions of their use of reading engagement strategies before and after using Actively Learn. Data reflect a pre-test mean of 2.66 (*SD* = .599) and a post-test mean of 3.19 (*SD* = .716). A significant increase from pre-test to post-test was found ($t(75) = -10.205$, $p < .001$). These results suggest one semester of using Actively Learn has a significant impact on students' perceptions of their use of reading engagement strategies. Guthrie and Klauda (2016) contended, "Higher qualities of engagement will generate higher qualities of reading achievement as manifested in vocabulary, literal comprehension, and reasoning (higher-order comprehension) performance" (p. 44).

Research question two. What is the difference in high school seniors' reading comprehension scores on the Standardized Test for the Assessment of Reading (STAR) after using Actively Learn to engage with texts as compared to their scores prior to using Actively Learn?

The STAR is a nationally-normed reading growth assessment that generates various data reported in a variety of forms (Renaissance Learning, 2015). For the purposes of this study, the domain score in the area of reading literary text was used to measure reading comprehension. This is reported as a score ranging from 0-100 that reflects an estimation of the individual student's percent of mastery on skills in this domain at the student's actual grade level (Renaissance Learning, 2015). This assessment may be given as many times as the instructor desires throughout the school year without compromising the efficacy of the results (Renaissance Learning, 2015). Based on the analysis of data from pre-test and post-test scores, there was no significant difference in reading comprehension scores on the STAR before and after using Actively Learn. The mean on the pre-test was 61.72 (SD = 19.976), and the mean on the post-test was 61.95 (SD = 20.163). Although there was an increase in the mean from pre-test to post-test ($t(75) = -.195$, $p = .846$), it was not statistically significant. These results suggest one semester of Actively Learn has no significant impact on students' reading comprehension when reading literary texts as measured by the STAR.

Research question three. What is the difference in high school seniors' vocabulary scores on the Standardized Test for the Assessment of Reading (STAR) after using Actively Learn to engage with texts as compared to their scores prior to using Actively Learn?

For the purposes of this study, the domain score for vocabulary in context, a sub-score in the area of reading literary text, was used. This is reported as a score ranging from 0-100 that reflects an estimation of the individual student's percent of mastery on skills in this domain at the student's actual grade level, and it is one of three scores used

to determine an overall reading comprehension domain score for reading literary text, the other two being character and plot and setting (Renaissance Learning, 2015). Based on the analysis of data from pre-test and post-test scores, there was no significant difference in vocabulary scores on the STAR before and after using Actively Learn. The mean on the pre-test was 59.16 (*SD* = 20.147), and the mean on the post-test was 60.00 (*SD* = 20.125). Although there was an increase in the mean from pre-test to post-test ($t(75) = -.709$, $p = .480$), it was not statistically significant. These results suggest one semester of Actively Learn has no significant impact on students' vocabulary scores when reading literary texts as measured by the STAR.

Research question four. What is the difference in the change in reading comprehension and vocabulary scores between the first and second administration of the Standardized Test for the Assessment of Reading (STAR) during their senior year for students in one Missouri school district during the 2017-2018 school year after using Actively Learn as compared to the change in scores between the first and second administration of the STAR for seniors during the 2013-2014, 2014-2015, 2015-2016, and 2016-2017 school years who did not use Actively Learn?

Based on a comparison of the change in scores between the first and second administration of the STAR for students in the primary investigator's senior English course during the 2013-2014, 2014-2015, 2015-2016, and 2016-2017 school years, when Actively Learn was not used, to the 2017-2018 school year, when Actively Learn was used, no statistically significant difference exists in pre-test and post-test scores in the areas of reading comprehension or vocabulary between the groups. These results suggest one semester of Actively Learn has no significant impact on students' reading

comprehension or vocabulary scores when reading literary texts as measured by the STAR.

Conclusions

The data from this study addressed three areas: student perceptions of their own engagement during assigned reading prior to and after applying the independent variable Actively Learn; differences in reading comprehension and vocabulary scores prior to and subsequent to applying the independent variable; and differences in reading comprehension and vocabulary scores between the school year during which the study took place and prior years during which the independent variable was not applied but students had the same instructor and reading materials. The results of this study revealed students perceived improvement in their overall reading engagement behaviors; however, there were no statistically significant improvements in reading comprehension or vocabulary scores during the study or when student scores were compared to those in previous years. The need to improve secondary reading achievement is reflected in stagnated test scores (National Center for Educational Statistics, 2017). New resources such as Actively Learn provide the opportunity for researchers to apply innovative techniques in the classroom to attempt to remedy this and to add to what is currently a small, contradictory body of research studies at this level (Duncan et al., 2016).

Data collected to answer research question one concerning student engagement provide support for the continued use of Actively Learn in the classroom. Students self-reported improvements in the use of Global Reading Strategies and Problem-Solving Strategies. Both of these areas involve awareness of the use of metacognitive skills, which have been shown to improve reading comprehension results (Kolić-Vehovec et al.,

2014; Marzano, 2017; Yen-Hui, 2016). However, students did not self-report an improvement in the area of Support Reading Strategies. This may be attributable to at least two factors. One factor that may be reflected in these results is that the mean pre-test score in this area was the highest of the three sub-scores. On a scale of one to five, the mean score for Support Reading Strategies on the pre-test was 3.19, as compared to the mean pre-test scores of 2.61 for Global Reading Strategies and 2.19 for Problem-Solving Strategies, leaving less room for improvement. Another factor that may be reflected is the skills required in this area did not lend themselves to use of the Actively Learn platform as presented by the instructor. Support strategies include notetaking, paraphrasing, summarizing, using reference materials, and underlining while reading (Mokhtari & Reichard, 2002). Although the program has the capability to do these things via technology, these uses of the program were not explicitly taught or required to be used by students during the study.

Although data collected to answer research questions two, three, and four do not demonstrate statistically significant improvements in reading comprehension and vocabulary, the fact students perceived their reading engagement strategies to have improved provides support for further use of Actively Learn. Data do not reflect a detrimental effect on student achievement, since mean student scores on the STAR were commensurate with or improved over previous years. Students historically do not show significant improvement on their STAR scores during their senior year. Possible reasons for this beyond lack of progress could be student attitude toward the assessment and the fact they have taken the assessment multiple times every year from early elementary throughout their senior year.

Since Actively Learn is a relatively new program, long-term studies are needed to determine if the increase in the use of metacognitive skills while reading, coupled with the opportunity for immediate instructor feedback, will prove to have different results if the program is used consistently for a longer span of time over multiple school years. Hattie (2012) and Fisher et al. (2016) asserted metacognitive skills and feedback have high effect sizes and beneficially impact reading comprehension, and Actively Learn provides the opportunity for the use of both of these highly effective instructional strategies (Actively Learn, 2017). Overall, increased student achievement is one desirable effect of classroom instructional strategies, and the use of Actively Learn appears to achieve this effect.

Implications for Practice

Actively Learn. This study provides insight into the areas of student engagement and reading achievement. Data support the continued use of Actively Learn to improve metacognitive skills during reading using embedded questioning and feedback. Based on the fact that during the first semester of their final year in high school, students perceived a statistically significant improvement in metacognitive reading strategies over a relatively short period of time, the introduction of this program earlier and its consistent use over time could allow further development of these skills. Since these skills have been linked to reading comprehension improvement (Fisher et al., 2016), long-term use could result in improvement of reading comprehension scores.

Instructional strategies. Significant improvement in student perceptions of the use of metacognitive strategies while reading supports further use of instructional strategies using technology both to embed varying levels of questions in reading

assignments and to monitor and provide timely feedback to students. Explicit teaching of the full capabilities of the program is also indicated to allow students to progress in the area of using support reading strategies. The proficiency of the instructor in using Actively Learn and effective questioning and feedback strategies was an assumption of this study; however, instructors should continue to participate in professional development activities to improve in these areas.

Training. Actively Learn (2017) is a relatively new platform and requires a combination of technology instruction, questioning strategies, feedback, and content knowledge. Although the program's basic features are fairly intuitive for a beginning user, to effectively use research-based instructional strategies while teaching relevant subject-area content requires intentional planning and implementation on the part of the instructor. As the program becomes more widely used, instructors who are successfully using it to fully implement content-area instruction need to provide training to new users to ensure best practices are consistently implemented.

Recommendations for Future Research

Continued research in the area of secondary reading improvement is necessary until data support progress is being made in this field. Current research in the area of reading focuses primarily in the elementary years on foundational skills that are easily measured and quantifiable. Reading comprehension and vocabulary skills are more difficult to measure, and many aspects of students' lives can affect their achievement in these areas outside of simple mastery of foundational skills. Current research focuses on the lowest-achieving readers, including those with diagnosed reading disabilities, but

does not give significant insight as to how to improve reading achievement for the entire secondary population.

As the use of technology becomes more prevalent in classrooms, further research is warranted as to the effectiveness of using both the devices and the applications available to improve teaching and learning. One-to-one technology is a relatively new learning and instructional tool, requiring additional knowledge on the part of the instructor for effective use. With the advent of this increase in access to devices, developers are able to increase the number of applications available to both teachers and students. However, it is imperative educators and researchers evaluate these applications if they are to be widely used based upon their potential to improve deep student learning, not simply for their appeal to students or the fact the teachers' jobs can be made easier, but only by sacrificing depth of knowledge.

Further latitudinal and longitudinal research is also warranted, specifically for Actively Learn. Since apparent improvements in student engagement in reading strategies were demonstrated during this study, research as to the long-term use across multiple school years is warranted, as well as studies of various timeframes in different grade levels and student populations. Although reading comprehension and vocabulary scores did not reflect improvement over the course of this study, research on the consistent use of Actively Learn with younger students throughout the course of their high school years across grades and subject areas could reveal different results. Research involving the impact of demographic factors such as gender, socioeconomic status, and regularity of attendance could also prove significant.

Summary

The purpose of this study was to determine if the use of an independent variable, Actively Learn, had a significant effect on student reading engagement, reading comprehension, and vocabulary. The population for this study included all seniors enrolled in a required senior English course in one Missouri school district. School District A is a rural district of approximately 1,500 students. The study took place over the course of one semester. The primary investigator used archival pre-test and post-test data from the MARSI and the STAR to measure student achievement. The MARSI was used to measure self-reported student perceptions as to strategies they applied while reading instructor-assigned texts. The STAR was used to measure reading comprehension and vocabulary skills while reading literary texts. Factors such as gender, socioeconomic status as measured by free and reduced lunch participation, and regularity of attendance during the administration of the independent variable were not taken into account.

The primary investigator was also the instructor for the course. The primary investigator's experience included 19 years in public education as both a teacher and administrator with five years of experience in her current position. She had extensive training in skills required for the study, including a bachelor's degree in the content area and specific professional development in questioning techniques, the teaching of metacognitive skills, and the use of feedback. Since Actively Learn is a relatively new platform, skills involved in using it instructionally were self-taught. The instructor piloted the application during the last part of the previous year in an elective English course.

Data from the study revealed a significant improvement in student perceptions of their use of metacognitive strategies while reading texts assigned by the instructor as measured by the MARSI. Specifically, data reflected significant perceived improvement in Global Reading Strategies, which include skills such as setting a purpose for reading, activating prior knowledge, predicting, previewing, skimming, and using textual features to aid comprehension (Mokhtari & Reichard, 2002). Data for the area of Problem-Solving Strategies, which includes adjusting reading rate, reflecting on the reading, rereading, visualizing information, reading out loud, and guessing the meaning of unknown words, also reflected significant improvement (Mokhtari & Reichard, 2002). Although the area of Support Reading Strategies did not reveal significant improvement, composite scores on the MARSI reflected statistically significant improvement in perceptions of reading engagement overall.

No significant improvement in reading comprehension or vocabulary was demonstrated over the course of the study, nor did data reflect improvement in reading comprehension or vocabulary for the group of students who used Actively Learn when compared to previous years' students taught by the same instructor without the use of Actively Learn. Although these findings could be attributed to the lack of efficacy of the program, the duration of the study and the limited population who participated also have to be taken into account. Due to the significant improvement in the desirable effect of student engagement, further research is warranted to determine if reading comprehension and vocabulary could be affected by long-term use of Actively Learn.

It is a consistent goal of educators and researchers to continually improve teaching and learning through the exploration of new strategies and tools. The area of

secondary reading has proven to be a difficult one in which to make progress. However, technology and the applications being developed for classroom use warrant continued research, as there are few skills more important to individual success than reading, both in the academic setting and in life.

Appendix A

Informed Consent from the Superintendent of Schools

School District

Office of the Superintendent

Lindenwood University Institutional Review Board
209 S. Kingshighway
St. Charles, MO 63301
(636) 949-2000 Insert Date

August 16, 2017

Dear Lindenwood University IRB:

On behalf of Public Schools, I am writing to grant permission for Tina Spencer, a doctoral student at Lindenwood University, to conduct her/his research titled, "A Study of the Effect of Actively Learn on Secondary Reading Engagement, Reading Comprehension, and Vocabulary." I understand that Tina Spencer will be using archival school data over the period of one school year for her study. We are happy to participate in this study and contribute to this important research.

Should you have any question related to this study, do not hesitate to contact this office.

Sincerely,

Superintendent of Schools

Appendix B

Informed Consent from the Site Principal

Lindenwood University Institutional Review Board
209 S. Kingshighway
St. Charles, MO 63301
(636) 949-2000

August 22, 2017

Dear Lindenwood University IRB:

On behalf of , I am writing to grant permission for Tina Spencer, a doctoral student at Lindenwood University, to conduct her research titled, "A Study of the Effect of Actively Learn on Secondary Reading Engagement, Reading Comprehension, and Vocabulary." I understand that Tina Spencer will be using archival school data over the period of one school year for her study. We are happy to participate in this study and contribute to this important research.

Sincerely

High School Principal

Appendix C

Consent to Use the MARSI

AMERICAN PSYCHOLOGICAL ASSOCIATION LICENSE TERMS AND CONDITIONS

Aug 24, 2017

This Agreement between Ms. Tina Spencer ("You") and American Psychological Association ("American Psychological Association") consists of your license details and the terms and conditions provided by American Psychological Association and Copyright Clearance Center.

The publisher has provided special terms related to this request that can be found at the end of the Publisher's Terms and Conditions.

License Number	4175380089736
License date	Aug 24, 2017
Licensed Content Publisher	American Psychological Association
Licensed Content Publication	Journal of Educational Psychology
Licensed Content Title	Assessing students' metacognitive awareness of reading strategies.
Licensed Content Author	Mokhtari, Kouider; Reichard, Carla A.
Licensed Content Date	Jun 1, 2002
Licensed Content Volume	94
Licensed Content Issue	2
Type of Use	Thesis/Dissertation
Requestor type	Academic institution
Format	Print
Portion	Measure, scale or instrument
Rights for	Main product
Duration of use	
Creation of copies for the disabled	no
With minor editing privileges	no
Distributing to	
In the following language(s)	Original language of publication
With incidental promotional use	no
The lifetime unit quantity of new product	0 to 499
The requesting person/organization is:	Tina Spencer, Lindenwood University Ed. D. Student
Order reference number	
Title of your thesis / dissertation	A Study of the Effect of Actively Learn on Secondary Reading Engagement, Reading Comprehension, and Vocabulary
Expected completion date	
Expected size (number of pages)	125
Requestor Location	Ms. Tina Spencer

20946 CR 341

SUMMERSVILLE, MO 65571
United States
Attn: Ms. Tina Spencer

Billing Type	Invoice
Billing Address	Ms. Tina Spencer 20946 CR 341 SUMMERSVILLE, MO 65571 United States Attn: Ms. Tina Spencer
Total	0.00 USD

Terms and Conditions

RightsLink Plus Terms and Conditions
American Psychological Association

The publisher for this copyrighted material is the American Psychological Association ("APA"). By clicking "accept" in connection with completing this licensing transaction, you agree that the following terms and conditions apply to this transaction (along with the Billing and Payment terms and conditions established by the Copyright Clearance Center, Inc. ("CCC") at the time that you opened your CCC account.

APA hereby grants you a non-exclusive license to use this material, subject to the conditions below.

1. Limited License.
   Licenses are for one-time use only with a maximum distribution equal to the number that you identified in the licensing process; any form of republication must be completed with 12 months from the date hereof (although copies prepared before then may be distributed thereafter); and any electronic posting is limited to a period of 12 months.

2. Credit Lines and Translation Disclaimer.
   The reproduced material must include one of the following credit lines:

   For English language content: Copyright © [year] by [Copyright Owner]. Reproduced [or Adapted] with permission. [Full bibliographic citation.]

   For translated language content: This material originally appeared in English as [full bibliographic citation]. Copyright © [year] by [Copyright Owner]. Translated and reproduced [or adapted] with permission. [Copyright Owner] is not responsible for the accuracy of this translation. This translation cannot be reproduced or distributed further without prior written permission.

3. Author Permission.
   You must obtain the author's (or, in case of multiple authorship, one author's) permission. A good faith effort must be made to locate the author and obtain the author's permission. Author permission is not required for the reuse of small excepts or 1 to 3 figures or 1 to 3 tables; or for course pack or electronic reserve use.

4. Geographic Rights.
   Licenses may be exercised anywhere in the world.

5. Book Edition Limit.
   If the APA content will be reproduced in a book, then permission is limited to the life of the current edition.

6. Online Use Limitations.
   APA full-text articles or book chapters may only be posted on a secure and restricted web

site. The credit line specified in Section 2 shall appear on the first screen on which the APA content appears and shall be amended to include the following additional wording: No further reproduction or distribution is permitted without written permission from the American Psychological Association.

7. Reservation of Rights.
APA reserves all rights not specifically granted in the combination of (i) the license details provided by you and accepted in the course of this licensing transaction, (ii) these terms and conditions and (iii) CCC's Billing and Payment terms and conditions.

8. License Contingent on Payment.
While you may exercise the rights licensed immediately upon issuance of the license at the end of the licensing process for the transaction, provided that you have disclosed complete and accurate details of your proposed use, no license is finally effective unless and until full payment is received from you (either by APA or by CCC) as provided in CCC's Billing and Payment terms and conditions. If full payment is not received on a timely basis, then any license preliminarily granted shall be deemed automatically revoked and shall be void as if never granted. Further, in the event that you breach any of these terms and conditions or any of CCC's Billing and Payment terms and conditions, the license is automatically revoked and shall be void as if never granted. Use of materials as described in a revoked license, as well as any use of the materials beyond the scope of an unrevoked license, may constitute copyright infringement and APA reserves the right to take any and all action to protect its copyright in the materials. "$0.00" fee means that APA waived the fee.

9. License Revocation.
APA or CCC may, within 60 days from the date of license, deny the permissions described in this License at their sole discretion, for any reason or no reason, with a full refund payable to you. Notice of such denial will be made using the contact information provided by you. Failure to receive such notice will not alter or invalidate the denial. In no event will APA or CCC be responsible or liable for any costs, expenses or damage incurred by you as a result of a denial of your permission request, other than a refund of the amount(s) paid by you to CCC for denied permissions.

10. Warranties.
APA warrants that it has, to the best of its knowledge, the rights to license reuse of this content. However, you must ensure that the material you are requesting is original to APA and does not carry the copyright of another entity (as credited in the published version). If any part of the material you have requested indicates that it was reprinted or adapted with permission from another source, then you should also seek permission from that original source to reuse the material.

11. Indemnity.
You hereby indemnify and agree to hold harmless APA and CCC, and their respective officers, directors, employees and agents, from and against any and all claims arising out of your use of the licensed material other than as specifically authorized pursuant to this license.

12. No Transfer of License.
This license is personal to you, but may be assigned or transferred by you to your employer or a business associate if you give prompt written notice of the assignment or transfer to the APA. No such assignment or transfer shall relieve you of the obligation to pay the designated license fee on a timely basis (although payment by the identified assignee can fulfill your obligation).

13. No Amendment except in Writing.
This license may not be amended except in a writing signed by both parties (or, in the case of APA, by CCC on APA's behalf).

14. Objection to Contrary Terms.
APA hereby objects to any terms contained in any purchase order, acknowledgment, check endorsement or other writing prepared by you, which terms are inconsistent with these terms and conditions or CCC's Billing and Payment terms and conditions. These terms and conditions, together with CCC's Billing and Payment terms and conditions (which are incorporated herein), comprise the entire agreement between you and APA (and CCC) concerning this licensing transaction. In the event of any conflict between your obligations

established by these terms and conditions and those established by CCC's Billing and Payment terms and conditions, these terms and conditions shall control.

15. Jurisdiction.
This license transaction shall be governed by and construed in accordance with the laws of the District of Columbia. You hereby agree to submit to the jurisdiction of the federal courts located in the District of Columbia for purposes of resolving any disputes that may arise in connection with this licensing transaction.

Other Conditions:
(1) APA permission is granted to use the Metacognitive Awareness of Reading Strategies Inventory in the Appendix on pp. 258-259 for Non-Commercial Research or Educational Use in: a) thesis or dissertation research (such as data collection or surveys) via an online password-protected website and/or in hardcopy format; and b) print and/or digital versions of the final thesis or dissertation document provided that digital distribution is limited to non-commercial, secure and restricted website(s). (2) The reproduced material must include the following credit line: Copyright © [indicate year] American Psychological Association. Reproduced [or Adapted] with permission. The official citation that should be used in referencing this material is [list the original APA bibliographic citation]. (3) For all online use: (a) The following notice must be added to the credit line: No further reproduction or distribution is permitted without written permission from the American Psychological Association; (b) the credit line must appear on the first screen on which the APA content appears; and (c) the APA content must be posted on a secure and restricted website.
v1.1

Questions? customercare@copyright.com or +1-855-239-3415 (toll free in the US) or +1-978-646-2777.

Appendix D

Permission to Use the STAR

RENAISSANCE®

August 8, 2017

Dear Tina Spencer:

The purpose of this letter is to grant you permission to use Renaissance's materials, including Renaissance Star Reading, in your research project.

If you have any questions about the research base for any of our products, please do not hesitate to contact the Research Department, email research@renaissance.com.

Best regards,

Eric Stickney
Director of Educational Research
Renaissance Learning, Inc.
901 Deming Way, Suite 301
Madison, WI 53717-1979
eric.stickney@renaissance.com
(608) 664-3880, ext. 2009
Fax: (608) 664-3882

Appendix E

Institutional Review Board Approval

LINDENWOOD

LINDENWOOD UNIVERSITY ST. CHARLES, MISSOURI

DATE:	September 18, 2017
TO:	Tina Spencer, EdS
FROM:	Lindenwood University Institutional Review Board
STUDY TITLE:	[1087023-1] Dissertation
IRB REFERENCE #:	
SUBMISSION TYPE:	New Project
ACTION:	DETERMINATION OF EXEMPT STATUS
DECISION DATE:	September 18, 2017
REVIEW CATEGORY:	Exemption category # *1*

Thank you for your submission of New Project materials for this research study. Lindenwood University Institutional Review Board has determined this project is EXEMPT FROM IRB REVIEW according to federal regulations.

We will put a copy of this correspondence on file in our office.

If you have any questions, please send them to IRB@lindenwood.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within Lindenwood University Institutional Review Board's records.

Appendix F

Metacognitive Awareness of Reading Strategies Inventory

Metacognitive Awareness of Reading Strategies Inventory
(MARSI) Version 1.0
Kouider Mokhtari and Carla Reichard © 2002

DIRECTIONS: Listed below are statements about what people do when they read academic or school-related materials such as textbooks, library books, etc. Five numbers follow each statement (1, 2, 3, 4, 5) and each number means the following:

- **1** means "I **never or almost never** do this."
- **2** means "I do this **only occasionally."**
- **3** means "I **sometimes** do this." (About **50%** of the time.)
- **4** means "I **usually** do this."
- **5** means "I **always or almost always** do this."

After reading each statement, **circle the number** (1, 2, 3, 4, or 5) that applies to you using the scale provided. Please note that there are **no right or wrong answers** to the statements in this inventory.

TYPE	STRATEGIES	SCALE				
GLOB	1. I have a purpose in mind when I read.	1	2	3	4	5
SUP	2. I take notes while reading to help me understand what I read.	1	2	3	4	5
GLOB	3. I think about what I know to help me understand what I read.	1	2	3	4	5
GLOB	4. I preview the text to see what it's about before reading it.	1	2	3	4	5
SUP	5. When text becomes difficult, I read aloud to help me understand what I read.	1	2	3	4	5
SUP	6.I summarize what I read to reflect on important information in the text.	1	2	3	4	5
GLOB	7. I think about whether the content of the text fits my reading purpose.	1	2	3	4	5
PROB	8. I read slowly but carefully to be sure I understand what I'm reading.	1	2	3	4	5
SUP	9.I discuss what I read with others to check my understanding.	1	2	3	4	5
GLOB	10. I skim the text first by noting characteristics like length and organization.	1	2	3	4	5
PROB	11. I try to get back on track when I lose concentration.	1	2	3	4	5
SUP	12. I underline or circle information in the text to help me remember it.	1	2	3	4	5
PROB	13. I adjust my reading speed according to what I'm reading.	1	2	3	4	5
GLOB	14. I decide what to read closely and what to ignore.	1	2	3	4	5
SUP	15. I use reference materials such as dictionaries to help me understand what I read.	1	2	3	4	5
PROB	16. When text becomes difficult, I pay closer attention to what I'm reading.	1	2	3	4	5
GLOB	17. I use tables, figures, and pictures in text to increase my understanding.	1	2	3	4	5
PROB	18. I stop from time to time and think about what I'm reading.	1	2	3	4	5
GLOB	19. I use context clues to help me better understand what I'm reading.	1	2	3	4	5
SUP	20. I paraphrase (restate ideas in my own words) to better understand what I read.	1	2	3	4	5
PROB	21. I try to picture or visualize information to help remember what I read.	1	2	3	4	5
GLOB	22. I use typographical aids like bold face and italics to identify key information.	1	2	3	4	5
GLOB	23. I critically analyze and evaluate the information presented in the text.	1	2	3	4	5
SUP	24. I go back and forth in the text to find relationships among ideas in it.	1	2	3	4	5
GLOB	25. I check my understanding when I come across conflicting information.	1	2	3	4	5
GLOB	26. I try to guess what the material is about when I read.	1	2	3	4	5
PROB	27. When text becomes difficult, I re-read to increase my understanding.	1	2	3	4	5
SUP	28. I ask myself questions I like to have answered in the text.	1	2	3	4	5
GLOB	29. I check to see if my guesses about the text are right or wrong.	1	2	3	4	5
PROB	30. I try to guess the meaning of unknown words or phrases.	1	2	3	4	5

Reference: Mokhtari, K., & Reichard, C. (2002). Assessing students' metacognitive awareness of reading strategies. *Journal of Educational Psychology*, 94 (2), 249-259.

Metacognitive Awareness of Reading Strategies Inventory
SCORING RUBRIC

Student Name: _____ Age: _____ Date: _____

Grade in School: □ 6th □ 7th □ 8th □ 9th □ 10th □ 11th □ 12th □ College □ Other

1. Write your response to each statement (i.e., 1, 2, 3, 4, or 5) in each of the blanks.
2. Add up the scores under each column. Place the result on the line under each column.
3. Divide the score by the number of statements in each column to get the average for each subscale.
4. Calculate the average for the inventory by adding up the subscale scores and dividing by 30.
5. Compare your results to those shown below.
6. Discuss your results with your teacher or tutor.

Global Reading Strategies (GLOB Subscale)	Problem-Solving Strategies (PROB Subscale)	Support Reading Strategies (SUP Subscale)	Overall Reading Strategies
1. _____	8. _____	2. _____	GLOB _____
3. _____	11. _____	5. _____	
4. _____	13. _____	6. _____	PROB_____
7. _____	16. _____	9. _____	
10. _____	18. _____	12. _____	SUP _____
14. _____	21. _____	15. _____	
17. _____	27. _____	20. _____	
19. _____	30. _____	24. _____	
22. _____		28. _____	
23. _____			
25. _____			
26. _____			
29. _____			
_____ GLOB Score	_____ PROB Score	_____ SUP Score	_____ Overall Score
_____ GLOB Mean	_____ PROB Mean	_____SUP Mean	_____Overall Mean

KEY TO AVERAGES: 3.5 or higher = High 2.5 – 3.4 = Medium 2.4 or lower = Low

INTERPRETING YOUR SCORES: The overall average indicates how often you use reading strategies when reading academic materials. The average for each subscale of the inventory shows which group of strategies (i.e., global, problem-solving, and support strategies) you use most when reading. With this information, you can tell if you are very high or very low in any of these strategy groups. It is important to note, however, that the best possible use of these strategies depends on your reading ability in English, the type of material read, and your purpose for reading it. A low score on any of the subscales or parts of the inventory indicates that there may be some strategies in these parts that you might want to learn about and consider using when reading (adapted from Oxford 1990: 297-300).

References

Actively Learn. (2017). *Stop skimming, start learning: How to ensure every student reads for depth.* Seattle, WA: Author.

Afflerbach, P. (2014). Self-assessment and reading success. *Reading Today, 32*(3), 30-31.

Afflerbach, P. (2016). *Handbook of individual differences in reading: Reader, text, and context*. New York, NY: Routledge.

Allington, R. L., & Gabriel, R. (2016). Classroom influences on individual differences. In P. Afflerbach (Ed.), *Handbook of individual differences in reading: Reader, text, and context* (pp. 197-208). New York, NY: Routledge.

Allington, R. L., McCuiston, K., & Billen, M. (2015). What research says about text complexity and learning to read. *Reading Teacher, 68*(7), 491-501. doi:10.1002/trtr.1280

American Psychological Association. (2010). *Publication manual of the American Psychological Association* (6th ed.). Lancaster, PA: Author.

Anderson, R. C. (1985). *Becoming a nation of readers: The report of the Commission on Reading*. Washington, DC: National Academy of Education.

Barry, A. (2008). Reading the past: Historical antecedents to contemporary reading methods and materials. *Reading Horizons, 49*(1), 31-52.

Bendak, L. (2018). Effects of applying repeated readings method on reading fluency and passage comprehension of slow learners. *Middle East Journal of Family Medicine, 16*(1), 232-237. doi:10.5742/MEWFM.2018.93226

Bluman, A. G. (2013). *Elementary statistics: A brief version* (6th ed.). New York, NY: McGraw-Hill.

Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). Los Angeles, CA: SAGE Publications.

Duncan, L. G., McGeown, S. P., Griffiths, Y. M., Stothard, S. E., & Dobai, A. (2016). Adolescent reading skill and engagement with digital and traditional literacies as predictors of reading comprehension. *British Journal of Psychology, 107*(2), 209-238. doi:10.1111/bjop.12134

Fisher, D., & Frey, N. (2014a). Close reading as an intervention for struggling middle school readers. *Journal of Adolescent and Adult Literacy, 57*(5), 367-376.

Fisher, D., & Frey, N. (2014b). Scaffolded reading instruction of content-area texts. *Reading Teacher, 67*(5), 347-351. doi:10.1002/trtr.1234

Fisher, D., & Frey, N. (2015). Selecting texts and tasks for content area reading and learning. *Reading Teacher, 68*(7), 524-529. doi:10.1002/trtr.1344

Fisher, D., & Frey, N. (2016). Systems for teaching complex texts. *Reading Teacher, 69*(4), 403-412. doi:10.1002/trtr.1409

Fisher, D., Frey, N., & Hattie, J. (2016). *Visible learning for literacy, grades K-12: Implementing the practices that work best to accelerate student learning*. Thousand Oaks, CA: Corwin.

Fraenkel, J. R., Wallen, N. E., & Hyun, H. (2015). *How to design and evaluate research in education* (9th ed.). New York, NY: McGraw-Hill Education.

Furman, L. R. (2015). *Technology, reading & digital literacy: Strategies to engage the reluctant reader*. Eugene, OR: International Society for Technology in Education.

Goldman, S. R., Snow, C., & Vaughn, S. (2016). Common themes in teaching reading for understanding: Lessons from three projects. *Journal of Adolescent & Adult Literacy*, *60*(3), 255-264. doi:10.1002/jaal.586

Guthrie, J. T., & Klauda, S. L. (2016). Engagement and motivational processes in reading. In P. Afflerbach (Ed.), *Handbook of individual differences in reading: Reader, text, and context* (pp. 41-53). New York, NY: Routledge.

Hattie, J. (2012). *Visible learning for teachers: Maximizing impact on learning*. London: Routledge.

Hattie, J. (2015). Hattie ranking: Interactive visualization. Retrieved from https://visible-learning.org/nvd3/visualize/hattie-ranking-interactive-2009-2011-2015.html

Hattie, J., & Yates, G. (2014). *Visible learning and the science of how we learn*. London: Routledge.

Heitin, L. (2016). ESSA reigns in, reshapes federal role in literacy. *Education Week, 35*(15), 19.

Hong-Nam, K., Leavell, A. G., & Maher, S. (2014). The relationships among reported strategy use, metacognitive awareness, and reading achievement of high school students. *Reading Psychology*, *35*(8), 762-790. doi:10.1080/02702711.2013.807900

Hooley, D., & Thorpe, J. (2017). The effects of formative reading assessments closely linked to classroom texts on high school reading comprehension. *Educational Technology Research & Development*, *65*(5), 1215-1238. doi:10.1007/s11423-017-9514-5

Javorsky, K., & Trainin, G. (2014). Teaching young readers to navigate a digital story when rules keep changing. *Reading Teacher*, *67*(8), 606-618. doi:10.1002/trtr.1259

Kallick, B., & Zmuda, A. (2017). *Students at the center: Personalized learning with habits of mind*. Alexandria, VA: ASCD.

Kieffer, M. J., & Stahl, K. D. (2016). Complexities of individual differences in vocabulary knowledge: Implications for research, assessment, and instruction. In P. Afflerbach (Ed.), *Handbook of individual differences in reading: Reader, text, and context* (pp. 26-40). New York, NY: Routledge.

Kolić-Vehovec, S., Zubković, B. R., & Pahljina-Reinić, R. (2014). Development of metacognitive knowledge of reading strategies and attitudes toward reading in early adolescence: The effect on reading comprehension. *Psihologijske Teme / Psychological Topics*, *23*(1), 77-98.

Kostons, D., & Werf, G. (2015). The effects of activating prior topic and metacognitive knowledge on text comprehension scores. *British Journal of Educational Psychology*, *85*(3), 264-275. doi:10.1111/bjep.12069

Laufer, B., & Aviad-Levitzky, T. (2017). What type of vocabulary knowledge predicts reading comprehension: Word meaning recall or word meaning recognition? *Modern Language Journal*, *101*(4), 729-741. doi:10.1111/modl.12431

Lemov, D. (2017). How knowledge powers reading. *Educational Leadership*, *74*(5), 10-16.

Lemov, D., Driggs, C., & Woolway, E. (2016). *Reading reconsidered: A practical guide to rigorous literacy instruction*. San Francisco, CA: Jossey-Bass.

Leu, D. J., Kiili, C., & Forzani, E. (2016). Individual differences in the new literacies of online research and comprehension. In P. Afflerbach (Ed.), *Handbook of individual differences in reading: Reader, text, and context* (pp. 259-272). New York, NY: Routledge.

Marzano, R. J. (2017). *The new art and science of teaching: More than fifty new instructional strategies for academic success*. Bloomington, IN: Solution Tree.

Metsala, J. L., & David, M. D. (2016). Individual differences in word recognition. In P. Afflerbach (Ed.), *Handbook of individual differences in reading: Reader, text, and context* (pp. 93-106). New York, NY: Routledge.

Missouri Department of Elementary and Secondary Education. (2016). Missouri learning standards. Retrieved from https://dese.mo.gov/college-career-readiness/curriculum/missouri-learning-standards

Mokhtari, K., & Reichard, C. A. (2002). Assessing students' metacognitive awareness of reading strategies. *Journal of Educational Psychology, 94*(2), 249-259.

Molin, L., & Lantz-Andersson, A. (2016). Significant structuring resources in the reading practices of a digital classroom. *Journal of Information Technology Education, 15*, 131-156.

Monaghan, E. J., & Barry, A. L. (1999). *Writing the past: Teaching reading in Colonial America and the United States 1640-1640.* New York, NY: International Reading Association.

National Center for Educational Statistics. (2017). NAEP long-term trend assessments. Retrieved from https://nces.ed.gov/nationsreportcard/ltt/

The National Commission on Excellence in Education. (1983). *A nation at risk: The*

imperative for educational reform. Washington, DC: U.S. Department of Education.

National Governors Association Center for Best Practices, Council of Chief State School Officers. (2010). *Common core state standards: English language arts.* Washington, DC: Author.

Ness, M. M. (2016). Reading comprehension strategies in secondary content area classrooms: Teacher use of and attitudes towards reading comprehension instruction. *Reading Horizons*, *55*(1), 58-84.

Neumann, M., Finger, G., & Neumann, D. (2017). A conceptual framework for emergent digital literacy. *Early Childhood Education Journal*, *45*(4), 471-479. doi:10.1007/s10643-016-0792-z

Nippold, M. A. (2017). Reading comprehension deficits in adolescents: Addressing underlying language abilities. *Language, Speech & Hearing Services in Schools*, *48*(2), 125-131. doi:10.1044/2016_LSHSS-16-0048

Paris, S. G. (2005). Reinterpreting the development of reading skills. *Reading Research Quarterly*, *40*(2), 184-202.

Pearson, P. D. (2000). *Reading in the twentieth century.* Ann Arbor, MI: Center for the Improvement of Early Reading Achievement.

Reid, A., Morrison, G., & Bol, L. (2017). Knowing what you know: Improving metacomprehension and calibration accuracy in digital text. *Educational Technology Research & Development*, *65*(1), 29-45. doi:10.1007/s11423-016-9454-5

Renaissance Learning. (2015). *STAR reading technical manual*. Wisconsin Rapids, WI:

Author.

Rennie, J. (2016). Rethinking reading instruction for adolescent readers: The 6 R's. *Australian Journal of Language & Literacy, 39*(1), 42-53.

Ritchhart, R., Church, M., Morrison, K., & Perkins, D. N. (2011). *Making thinking visible: How to promote engagement, understanding, and independence for all learners*. San Francisco, CA: Jossey-Bass.

Schoenbach, R., & Greenleaf, C. (2017). Leading for literacy. *Phi Delta Kappan, 99*(3), 59-64. doi:10.1177/0031721717739596

Schwanenflugel, P. J., & Kuhn, M. R. (2016). Reading fluency. In P. Afflerbach (Ed.), *Handbook of individual differences in reading: Reader, text, and context* (pp. 107-119). New York, NY: Routledge.

Seok, S., & DaCosta, B. (2017). Gender differences in teens' digital propensity and perceptions and preferences with regard to digital and printed text. *Techtrends: Linking Research & Practice to Improve Learning, 61*(2), 171-178. doi:10.1007/s11528-016-0134-4

Shanahan, T. (2014). Educational policy and literacy instruction. *Reading Teacher*, *68*(1), 7-12. doi:10.1002/trtr.1269

Shanahan, T., Fisher, D., & Frey, N. (2012). The challenge of challenging text. *Educational Leadership*, *69*(6), 58-62.

Smith, T. (2016). Exponential reading growth: Celebrating digital ELA curriculum success. *Tech & Learning, 37*(5), 22-33.

Snell, E. K., Hindman, A. H., & Wasik, B. A. (2015). How can book reading close the word gap? Five key practices from research. *Reading Teacher*, *68*(7), 560-571.

doi:10.1002/trtr.1347

Snow, C. E., & Matthews, T. J. (2016). Reading and language in the early grades. *Future of Children*, *26*(1), 57-74.

Snow, C., & O'Connor, C. (2016). Close reading and far-reaching classroom discussion: Fostering a vital connection. *Journal of Education*, *196*(1), 1-8.

Springer, S. E., Wilson, T. J., & Dole, J. A. (2014). Ready or not. *Journal of Adolescent & Adult Literacy*, *58*(4), 299-307. doi:10.1002/jaal.363

Stahl, K. D. (2011). Applying new visions of reading development in today's classrooms. *Reading Teacher*, *65*(1), 52-56. doi:10.1598/RT.65.1.7

Stahl, K. D. (2014). New insights about letter learning. *Reading Teacher*, *68*(4), 261-265. doi:10.1002/trtr.1320

Unrau, N. J., & Quirk, M. (2014). Reading motivation and reading engagement: Clarifying commingled conceptions. *Reading Psychology*, *35*(3), 260-284. doi:10.1080/02702711.2012.684426

U.S. Department of Education. (2002). No Child Left Behind Act. Retrieved from http://www.ed.gov/policy/elsec/leg/esea02/107-110.pdf

U.S. Department of Education. (2015). Every Student Succeeds Act. Retrieved from https://www.gpo.gov/fdsys/pkg/BILLS-114s1177enr/pdf/BILLS-114s1177enr.pdf

Van den Broek, P., Mouw, J. M., & Kraal, A. (2016). Individual differences in reading comprehension. In P. Afflerbach (Ed.), *Handbook of individual differences in reading: Reader, text, and context* (pp. 138-150). New York, NY: Routledge.

Vaughn, S., Roberts, G., Schnakenberg, J. B., Fall, A., Vaughn, M. G., & Wexler, J. (2015). Improving reading comprehension for high school students with

disabilities. *Exceptional Children*, *82*(1), 117-131. doi:10.1177/0014402915585478

Veenman, M. V. (2016). Metacognition. In P. Afflerbach (Ed.), *Handbook of individual differences in reading: Reader, text, and context* (pp. 26-40). New York, NY: Routledge.

Vogt, M., & Shearer, B. A. (2011). *Reading specialists and literacy coaches in the real world* (3rd ed.). Boston, MA: Pearson.

Wigfield, A., Gladstone, J. R., & Turci, L. (2016). Beyond cognition: Reading motivation and reading comprehension. *Child Development Perspectives*, *10*(3), 190-195. doi:10.1111/cdep.12184

Yen-Hui, W. (2016). Reading strategy use and comprehension performance of more successful and less successful readers: A think-aloud study. *Educational Sciences: Theory & Practice*, *16*(5), 1789-1813. doi:10.12738/estp.2016.5.0116

Vita

Tina Spencer was born and raised on her family's farms in south-central Missouri. Her career in education began as a high school English teacher in Vienna, Missouri. From there, she moved to the Mountain View-Birch Tree R-III district, where after teaching English for seven years, she entered administration, serving as the Director of Special Programs for six years. She went to Salem R-80 as Assistant Superintendent, serving there for one year before leaving education to pursue an opportunity in private business near Mountain Home, Arkansas. After several years in private business, Tina re-entered education as a classroom teacher in the Willow Springs R-IV School District, teaching senior English, where she continues to serve.

Tina holds a Bachelor of Science degree in English, a Master of Science degree in Secondary Administration, and a Specialist degree in the Superintendency, all from Missouri State University in Springfield, Missouri.