A COMPARISON OF VERBAL AND WRITTEN METACOGNITIVE STRATEGIES USED BY HIGH SCHOOL STUDENTS IN A LANGUAGE ARTS CLASSROOM

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A COMPARISON OF VERBAL AND WRITTEN METACOGNITIVE STRATEGIES
USED BY HIGH SCHOOL STUDENTS IN A LANGUAGE ARTS CLASSROOM

By

JENNIFER E. GANNAIO

A doctoral dissertation submitted to the
College of Education
in partial fulfillment of the requirements
for the degree Doctor of Education
in Curriculum and Instruction

Southeastern University
July 2017
A COMPARISON OF VERBAL AND WRITTEN METACOGNITIVE STRATEGIES USED
BY HIGH SCHOOL STUDENTS IN A LANGUAGE ARTS CLASSROOM

by

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DEDICATION

I have been surrounded by an amazing amount of support and encouragement throughout this process. One of my earliest memories as a child is “playing school” with my mother, where I was inspired to think and create. I believe it was this foundation set by my parents, John and Nancy Carson, which started my love of learning and excitement for the pursuit of education.

I would also like to thank my coworkers and Administration at Calvary Christian High School who have continually cheered me on in this process and supported my research. Mr. David Kilgore, Headmaster, generously provided open access to the school during weekends and holiday breaks, allowing me precious time to work in a comfortable environment and without interruption. Dr. Nina Graham has always had her door open for brainstorming, and shared the excitement for growth in the field of teaching with a great passion. Mr. Todd Bohlander has been a regular source of encouragement, a friendly dose of reality, and a voice of motivation for me throughout this journey. I am grateful for Mrs. Jessica Weaver for welcoming me into her classroom for this study, and Mrs. Natalie Wall for her encouragement and support throughout the process. My students have also been an inspiration to me, as I seek to refine and develop my classroom practice in support of their achievement.

Finally, this accomplishment would not have been realized but for the selfless commitment of my family. I cannot adequately describe how supportive my precious children- Anthony, Alexandra, Joseph, Julia, and Abigail- have been during this process, and it was their excitement and encouragement that truly motivated me to push through many challenges. My
dear husband, John Gannaio, a true unsung hero, has continually worked to protect my time, help me to stay positive, and cheer me toward the finish line. His loving selflessness during the lengthy process of my graduate work has blessed me beyond measure.

Ultimately, this achievement belongs to the Lord. The learning process has allowed me to clearly experience His guidance and explore His design for me, as I seek to follow His plan for my life.
ACKNOWLEDGMENTS

The College of Education at Southeastern University has been instrumental in designing a program that strategically empowered me to finish this degree with excellence. It has truly been a privilege to be a part of this season at Southeastern University.

I am deeply humbled and honored to have worked with my committee, Dr. Susan Stanley, Dr. Thomas Gollery, and Dr. Nina Graham through this process. They have been a continual source of encouragement and positive support throughout this endeavor. Their combined expertise, wisdom, and creativity produced precious insight and guidance for me, for which I remain deeply thankful.
ABSTRACT

The purpose of the study was to compare verbal and written metacognitive strategies used by 10th grade students in an English Language Arts (ELA) classroom. A convenience sample of forty-seven students were divided into two equivocal treatment groups. Both groups were first pretested by completing an ACT reading passage with accompanying questions. Following the reading task, both groups completed the Metacognitive Awareness of Reading Strategy Inventory (MARSI). The sample was divided into two treatment groups, one group receiving daily enrichment style instruction in verbal metacognitive strategies, and the other treatment group receiving instruction in both written and verbal strategies. Following the enrichment sessions, students in both groups were post tested with a similar reading comprehension task, and completed the MARSI again. The data were analyzed using descriptive, inferential, and associative/predictive techniques to address the research questions. The findings suggest that regardless of the method of strategy use, metacognitive strategy instruction is effective and in the study, and produced a statistically significant increase in student reported use, as well as improved performance on an academic reading task. Verbal strategies appeared to have an edge over written and verbal combination for frequency of use and overall reading comprehension achievement, although not statistically significant. When considering the issue of which metacognitive strategy exerts a more productive relational/predictive effect, the combination of written and verbal strategies seems to be preferable. Limitations and implications for professional practice were discussed, and future research was suggested.
Key Words: metacognition; metacognition instruction; reading comprehension; comprehension strategies; monitored comprehension; verbal metacognition strategies; written metacognition strategies.
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I. INTRODUCTION

Metacognition is the awareness and application of thinking strategies that are used during one’s learning process. Metacognitive strategies have been identified and used in classrooms to help learners plan, monitor and evaluate their learning. These strategies are important for teachers to understand so their students may develop stronger critical thinking skills, foster growth in their ability to learn independently, and regulate their own cognitive activity. Many students do not arrive in classrooms with an awareness of metacognition, but it is widely understood that cognition strategies have a high correlation to academic, professional, and personal success (Hrbáčkovaa, Hladíkb & Vavrovac, 2012).

Background and Review of Relevant Literature

Research has examined metacognitive strategies with an understanding that these strategies can be taught to learners of all ages. Consequently, instructional approaches have emerged that seek to help learners grow in their use of metacognitive practices. Often, this takes the shape of verbal modeling by instructional staff as tasks are addressed. Pre-learning activities, active questioning, “think-alouds”, and other such techniques are often verbal strategies that are used to help students develop their metacognitive responses to learning. However, little has been discussed in literature about the effectiveness of written descriptions of metacognitive activity versus verbal demonstrations, particularly in the area of reading comprehension.

Flavell (1979, p.906) initially developed the term "metacognition" in the late 1970s and is considered the originator of this concept. As the years passed, this definition has been widely accepted as a foundation for the multidisciplinary discussion of metacognition. Flavell (1979) simply defined metacognition as the learners’ ability to think about their thinking and defined cognitive knowledge as the understanding about one's own cognitive strengths and limitations.
These limitations included the internal and external factors that may affect cognition. Flavell (1979) organized knowledge into three types that include *person*, *task*, and *strategy* knowledge. *Person* knowledge includes what the learner believes about humans as thinkers, while *task* knowledge addresses the understanding about the needs of different tasks. *Strategy* knowledge seeks to identify the types of strategies that would most likely be successful for any given problem.

It has been understood that children typically do not begin to build metacognitive skills until early elementary age (Whitebread, Coltman, Pasternak, Sangster, Grau, & Demetriou, 2009). Commonly accepted Piagetian theory described the inability of young children to think abstractly. As the skill of executive functioning is typically more emergent in nature for young children, researchers suggested that it must be present in order for metacognition to develop (Carlson & Moses, 2001). Kuhn (2000) described metacognition as a gradual acquisition of continually improving cognitive approaches that replace strategies that are regarded as ineffective by the learner through experience.

Through the review of the literature, there quickly became an understanding that a shared use of the term between the fields of cognitive psychology and education existed. Cognitive psychology literature makes mention of an awareness and management of an individual's thoughts as a key component of metacognition (Kuhn & Dean, 2004). Haribhai (2012) described metacognition as the ability for a person to discover or learn for themselves by organizing their problem-solving approaches. An additional aspect explored in the field of psychology was the inclusion of the concept of executive control, which encompasses self-regulation and the monitoring of the learning process by the student (Schneider & Lockl, 2008).
An important assertion about metacognition was offered by Kuhn & Dean (2004), who suggested that it is the ability of a student to transfer a specific problem-solving strategy to a similar problem in a different situation or context. Schraw (1998) wrote extensively on the topic of metacognition, and described the concept as a wide group of skills that can be applied to many different learning opportunities. Schraw also suggested that metacognition may actually compensate for certain deficits in intelligence, prior knowledge, or experience in certain learning tasks (1998). The professional literature further suggested that metacognitive skillfulness is a general, person-related characteristic across age groups, rather than being domain-specific. Moreover, metacognitive skills appear to develop and to contribute to learning performance, partly independent of intelligence (Veenman, Wilhelm, & Beishuizen, 2004). Subsequent studies by Veenman, Van Hout-Wolters, & Afflerbach (2006) summarized various research that determined metacognitive skills, although moderately correlated to intelligence, contribute to learning success beyond intellectual ability.

Metacognition has two interdependent aspects that include a learner’s knowledge about their thinking process and their monitoring of that process (Schraw, Crippen, & Hartley, 2006). Other research expanded the concept to include declarative and procedural knowledge in order to clarify different types of cognitive knowledge (Cross & Paris, 1988; Schraw & Moshman, 1995). Paris and Winograd (1990) presented the process of self-reflection about personal knowledge and a self-assessment of whether or not a learner acknowledges his/her understanding or lack thereof of a concept. Procedural knowledge was defined as the awareness and management of thinking including the learners' knowledge about appropriate strategies that would be successful within a given learning task (Cross & Paris, 1988).
Another aspect of metacognition explored by the literature was the monitoring of thinking, which is also often categorized into specific steps that included planning, monitoring, and evaluating (Cross & Paris, 1988; Paris & Winograd, 1990; Schraw et al., 2006). Planning involves the selection of strategies and the setting of goals. Monitoring involves an awareness of understanding, while evaluation includes the appraisal of whether a task has been successful and the execution of a revision of goals if necessary (Schraw et al., 2006). Halpern & Walberg (1988) offered support for this concept and proposed a descriptive framework that addressed awareness, self-questioning, the activation of relevant background knowledge and experiences, and summarizing to support understanding.

Fortunately for learners, research suggested that metacognitive strategies can be taught (Kramarski & Mevarech, 2003). Researchers analyzed nearly 20 studies and determined that teaching interventions aimed at developing metacognitive strategies needed to be at least 10 minutes long and should include such skills as self-questioning, informational search strategies, and other such techniques (Halpern et al, 1988). Strategies to support learning in content areas such as math, reading, and science have all shown that students who receive explicit training tended to grow in their metacognitive skills (Kramarski & Mevarech, 2003). In fact, research demonstrated metacognitive ability improved significantly with age during adolescence and suggested that awareness of one’s own perceptual decisions followed a continued developmental path during adolescence particularly when supported by instruction of metacognitive strategies (Weil, Fleming, Dumontheil, Kilford, Weil, Rees, Dolan & Blakemore, 2013).

As teachers seek to support their students' learning, there are some areas where effort may produce more value than others. Many studies have shown the power of providing explicit instruction for both cognitive knowledge and the development of self-regulation. Cross and Paris
(1988) maintained that explicit instruction is necessary in declarative, procedural and conditional knowledge. Schraw (1998) instructed teachers to train students how to use strategies, when to choose specific strategies, and when one type of strategy might be preferable over another for a specific task. The monitoring and regulating of cognition is another important part of the metacognitive process as well. This can be aided through the use of checklists that note planning, monitoring, and evaluations, encouraging a systematic approach to problem-solving (Schraw, 1998).

Collaboration and cooperative learning environments were also advised as an effective way to support the development of metacognitive skills (Martinez, 2006; McLeod, 1997). Much of the literature, which aligned with foundations of development described by Piaget and Vygotsky, acknowledged the importance of social interaction in order to encourage proper cognitive development (Halpern, 1998). Morrone, Harkness, D’Ambrosio, & Caulfield (2004) noted that activities in various content areas that provided a critical discourse among students had the ability to create a type of healthy conflict which led to the support and clarification of students’ assertions and beliefs.

Any type of conversation or exchange during a learning task, however, may not necessarily be sufficient. Kramarski and Mevarech (2003) noted that collaborative learning works best when students have received direct instruction concerning how to collaborate, communicate, and engage in a constructive discourse. According to the Association of American Educators (2017), direct instruction of collaborative strategies should include how to formulate high quality questions to support dialog, as well as post task reflection about the effectiveness of the actual collaborative process itself.
The making of student thinking and knowledge visible by having students create written models that illustrate the concept has also grown in popularity. The creation of such visible thinking models has become a recent topic of study in the field of education and continues to develop. Routines that support the production of a tangible product, illustration, or graphic representation are associated with a higher level of student achievement, engagement, and understanding (Reichard, Church, & Morrison, 2011). As with any similar routine, the research showed that teachers need to model and demonstrate the metacognitive strategies in use during instruction through think alouds or other such measures (Martinez, 2006).

While the importance of metacognitive strategies was clear throughout the literature, the clarity involving assessment of such strategies was a bit more challenging. Primarily, metacognition was not described as specifically observable (Sperling, Howard, Miller, & Murphy, 2002). Researchers argued that self-report methods rely too heavily on verbal abilities to attempt to measure metacognitive strategies (Whitebread et al., 2009). These researchers continued by suggesting that strategies such as learner spoken narrations of the thinking process may be unable to fully capture cognitive processes that are not so easily articulated. The concept of metacognition itself was rather complex, and created challenges for researchers to assess it (Ozturk, 2017). Since schools did not typically assess metacognition as a part of their normal curriculum, most examinations of metacognitive strategy assessment described in the literature emerged from an experimental setting rather than an organic classroom environment.

Studies that explored metacognition tend to identify one or two specific dimensions of the concept. According to Schneider (2008), the most frequently explored type of metacognition was the skill of self-monitoring. A variety of studies focused on a comparison of students' perceived efficacy with a task, with the actual performance outcome of the task. Self-report
techniques, such as rating scales, were also frequently used to assess both general and domain specific metacognition (Tindal & Nolet, 1995). In fact, some researchers argued that observational methods surpassed self-report methods, because they recorded actual learned behaviors which allowed nonverbal behaviors to be taken into account (Whitebread et al., 2009). In addition, reading activities that involved students in various stages of the writing process offered sample evidence to track metacognitive strategies in use (Perry, 1998).

Much of the recent literature focused on the use of written metacognitive strategies as they pertained to math learning. Taylor and McDonald (2007) discussed a first year university mathematics course in which group work and mathematical communication skills, especially writing skills, were used as a tool to develop non-routine problem solving skills. Williams (2003) emphasized the importance of implementing effective problem solving strategies in mathematics to improve problem solving performance. A comparison of verbal and written descriptions of certain mathematical tasks was conducted by Pugalee (2004), who found that the learners who organized their learning using written descriptions were more successful than those who only used verbal strategies. More needs to be learned about the effectiveness of specific metacognitive strategies themselves in order to help learners become adept at the utilization of these concepts.

**Purpose Statement**

While significant research has identified the importance of metacognitive strategies, there needs to be continued attention directed to determine which types of activities best support the development of these skills. The purpose of this study is to compare the efficacy between written and verbal metacognitive strategies used by high school students in the reading process.

**Research Question(s)**

The research questions are as follows:
Research Question 1: Considering participant use of overall reading strategies, will participants who received verbal metacognitive strategies and participants who received a combination of both verbal and written metacognitive strategies manifest increases in their frequency of use of those strategies?

Research Question 2: Considering participant use of overall reading strategies, is there a difference between students who received verbal metacognitive strategies and those participants who were exposed to a combination of both verbal and written metacognitive strategies in their frequency of use of those strategies?

Research Question 3: Considering participant respective reading comprehension achievement, will there be an increase in achievement level with participants receiving verbal metacognitive strategies and with those participants who have received a combination of both verbal and written metacognitive strategies?

Research Question 4: Considering participant respective reading comprehension achievement, will there be a difference in achievement level with participants receiving verbal metacognitive strategies compared to those participants who have received a combination of both verbal and written metacognitive strategies?

Research Question 5: Considering metacognitive strategy use within the three respective Sub-Scales, which strategy will exert the greatest influence upon participant perceived frequency use of metacognitive strategies?

Research Question 6: Regarding the methods of metacognitive strategy instruction, which of the three sub scales represents the most robust correlate and predictor of participant reading comprehension achievement?

**Quantitative Research Hypotheses**
In response to the proposed research questions posed for this study:

Research Question 1: Considering participant use of overall reading strategies, will participants who received verbal metacognitive strategies and participants who received a combination of both verbal and written metacognitive strategies manifest increases in their frequency of use of those strategies?

Hypothesis R1: Both metacognitive strategies utilized in the study will promote statistically significant increases in participant perceived use of the respective strategies.

Research Question 2: Considering participant use of overall reading strategies, is there a difference between students who received verbal metacognitive strategies and those participants who were exposed to a combination of both verbal and written metacognitive strategies in their frequency of use of those strategies?

Hypothesis R2: Participants exposed to both verbal and written metacognitive strategies will manifest statistically significantly greater levels of frequency of strategy usage than their peers who have received only verbal metacognitive strategies.

Research Question 3: Considering participant respective reading comprehension achievement, will there be an increase in achievement level with participants receiving verbal metacognitive strategies and with those participants who have received a combination of both verbal and written metacognitive strategies?

Hypothesis R3: Participants receiving both metacognitive strategies will demonstrate statistically significant increases in reading achievement.

Research Question 4: Considering participant respective reading comprehension achievement, will there be a difference in achievement level with participants receiving verbal metacognitive
strategies compared to those participants who have received a combination of both verbal and written metacognitive strategies?

Hypothesis R4: Considering participant reading comprehension achievement, there be a statistically significant difference in achievement level with participants receiving verbal and written metacognitive strategies compared to those participants who have received only verbal metacognitive strategies.

Research Question 5: Considering metacognitive strategy use within the three respective Sub-Scales, which strategy will exert the greatest influence upon participant perceived frequency use of metacognitive strategies?

Hypothesis R5: Considering metacognitive strategy use within the three respective Sub-Scales, the combination of verbal and written strategy will exert the greatest influence upon participant perceived frequency use of metacognitive strategies.

Research Question 6: Regarding the methods of metacognitive strategy instruction, which of the three sub scales represents the most robust correlate and predictor of participant reading comprehension achievement?

Hypothesis R6: At least one of the three Sub-Scales will represent a statistically significant correlate and predictor of participant reading achievement for each treatment group.

**Methods**

To approach this study, approximately forty-five 10th grade students at a Pinellas County private high school were identified and used. The sample was a convenience sample of students in English II Honors (10th Grade) based on the most recent standardized test scores available. The participants were divided into equivocal treatment groups. All participants were given an abbreviated *American College Testing* (ACT) reading assessment. Each group was also
administered the *Metacognitive Awareness of Reading Strategies Inventory*, also referred to as the MARSI (Mokhtari & Reichard, 2002), a standardized assessment tool to measure metacognitive awareness.

The MARSI is a self-report instrument for students with grade equivalents ranging from fifth grade through college (Mokhtari & Reichard, 2002). This inventory is designed to assess the perceived use of reading strategies while reading academic or school related materials. The tool assesses 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 has when faced with an academic reading task (Mokhtari & Reichard, 2002). It contains 30 statements regarding reading strategy use to which students respond using a 5-point Likert type scale from 1 (I never do this) to 5 (I always do this). The MARSI has three strategy sub-scores: Global Reading Strategies, Problem-Solving Strategies, and Support Reading Strategies (Mokhtari & Reichard, 2002). Student scores are grouped into average scores for the three areas, as well as an overall score.

The MARSI was developed with the help of three expert judges experienced in teaching and assessing reading strategies. MARSI has been demonstrated as a valid and reliable measure for assessing student comprehension monitoring (Mokhtari and Reichard, 2002). The MARSI was validated using a large native speaker population (N=825) consisting of students with reading levels ranging from middle school to college. The internal consistency reliability coefficients as determined by Cronbach’s alpha for its three subscales, which were based on the results of a series of factor analyses, were Global Reading Strategies (.92), Problem Solving Strategies (.79), and Support Strategies (.87). The overall reliability for the scales was .93,
indicating a reasonably dependable measure of students’ metacognitive awareness of reading strategies. (Mokhtari and Sheorey, 2002).

For the purposes of the research, all of the students participated in two weeks (10 sessions) of treatment composed of enrichment sessions at the beginning of each English II Honors class meeting. These 10 minute enrichment sessions focused on the introduction and training of metacognitive strategies support the reading process. The treatment was designed to specifically address the techniques measured by the global, problem solving and support strategies in the MARSI instrument, and was designed by the researcher.

The verbal strategy group received specific instruction of metacognitive strategies that were exclusively verbal in nature, or produced a verbal application of the strategy being taught. The written and verbal strategy group received instruction focused on both verbal and written metacognitive strategies, with no limitations placed on the participants use of written or verbal behaviors in relation to the strategies presented.

Following the training, both groups were administered a different sample ACT reading passage test. Scores were compared between the two groups. Following the training, both groups were also re-administered the MARSI, and scores were compared between the two groups.

Analysis

This study comprised a non-randomized controlled group pretest/posttest design. Study data were analyzed using a variety of statistical techniques. Specifically, descriptive, inferential, and associative/predictive statistical techniques were applied to study data to address formally stated research questions and hypotheses. The researcher examined pretest performance differences. The tasks completed by each treatment group were also analyzed to determine academic achievement as well as the frequency of usage of metacognitive strategies.
Definitions of Terms

- **Secondary English Language Arts** - Secondary English Language Arts is defined as English language arts curriculum taught during grades 6-12.

- **Metacognition** - Metacognition is defined as the knowledge and awareness of one's cognitive strengths and weaknesses as well as self-regulation, which guides an individual in the coordination of that awareness while engaged in cognitive activities (Wong, 1999).

- **Metacognitive Strategies** - Metacognitive strategies are the intentional use of strategies in order to control understanding of a task or learning objective, including orientation strategies, planning strategies, strategies for regulation of the thinking processes, strategies for monitoring the approach, and strategies for the evaluation of the outcome of task processing (Efklides, 2008).

- **Reading Comprehension** - Reading comprehension may be understood as the process of simultaneously extracting and constructing meaning through interaction and involvement with written language (Snow, 2002).

- **Verbal Metacognitive Strategies** - Verbal metacognitive strategies are defined as the spoken or stated plans and responses that support the organization of new knowledge during the learning process. This verbal dialog that occurs during the learning process may be produced either collaboratively, with other learners, or to oneself.

- **Written Metacognitive Strategies** - Written metacognitive strategies are defined as the physical articulation in a permanent format through written symbols that specifically reflect cognitive behaviors about the material and supports the organization of new knowledge during the learning process.
• *Cognitive Processes*- Cognitive processes will be defined as the mental processes, such as perception, memory, language, problem solving, and abstract thinking, involved with learning (Gerrig & Zimbardo, 2002).

• *Global Reading Strategies*- Global reading strategies can be thought of as generalized, intentional reading strategies aimed at setting the stage for the reading act. These strategies include such behaviors as setting a purpose for reading and making predictions during an interaction with the text (Mokhtari & Reichard, 2002).

• *Problem Solving Strategies*- Problem solving strategies are the strategies used during the reading of a text when difficulty is encountered by the reader. Examples of problem solving activities include re-reading challenging portions of the text, or the adjustment of reading speed to support understanding (Mokhtari & Reichard, 2002).

• *Support Strategies*- Support strategies are the functional or ongoing strategies a reader uses to navigate the ongoing reading process successfully. Summarizing and confirming predictions are examples of support strategies (Mokhtari & Reichard, 2002).

**Chapter Summary**

It is critical for students to develop metacognitive skills in order to successfully maximize the task of learning. Teaching individuals to organize and prioritize their thinking processes has been shown to result in a myriad of benefits, personally and academically. However, these skills do not develop naturally for all learners, and the intentional instruction of strategies that support metacognition have been shown to be effective when explicitly taught in the classroom setting.

The optimal time to teach reflective thinking skills begins after the elementary school age for most students, creating a rich opportunity for teachers to support their students’ learning throughout the middle and high school years. Instruction for learners should include the “how,
when, and why” that governs strategy selection among different learning tasks. Ultimately, the ability to choose and apply an appropriate strategy becomes a key indicator of metacognitive expertise.

While the importance of metacognition and the associated skills remains an accepted practice in education, it is understood that taking extended time from the instruction of content is often an unrealistic expectation. As a result, it is important to identify the strategies most worth teaching based on their effectiveness. More research needs to occur which explores the effectiveness of specific strategies on the learning process, and how these skills may be cultivated through explicit instruction in our classrooms.

Chapter 2 includes a review of metacognition literature that points to the importance of exploring the effectiveness of various strategies. The foundation and evolution of an understanding of metacognition across various disciplines will be explored. Additionally, metacognitive strategy awareness, instruction and reading comprehension are discussed as a foundation for the conceptual framework that will inform the proposed study.
II. REVIEW OF LITERATURE

As appreciation for the value of metacognition has grown in the field of education; the focus of its study has narrowed to explore powerful learning strategies that are often overlooked in many of today’s classrooms and curriculums. Metacognition is the awareness and application of thinking strategies that are used during one’s learning process. It is a valuable aspect of education, because it supports learners as they become active and reflective participants in their learning process (Marzano, 2009). Metacognition has been described as vital for a student’s academic success (Knox, 2017).

Rooted in cognitive development, proponents of metacognition believe that related skills can be developed and refined over time as both an outcome and producer of learning (Paris & Winograd, 1990). Metacognition is particularly favorable for encouragement in a classroom setting, and students can be supported through ongoing conversations, modeling, and reflecting upon strategic thinking (Paris, Wasik, & Turner, 1991).

A Historical Interest in Thinking

As far back as Socrates and Confucius, reflection was regarded as valuable to achieve higher level of learning in life (Ellis, Bond, & Denton, 2014). According to Plato, an awareness of cognition was seen as a valuable way to manage learning (Georghiades, 2004). Aristotle suggested that the mind had a powerful level of operation that went beyond the known senses, alluding to the contemporary concept of metacognition. The term “metacognition” originates
from the Greek word *meta*, which means after or beyond, and the Latin word *cognoscere*, to know or ponder (Ellis, Bond, & Denton, 2014).

**Biblical Support for Metacognition**

Interest in the process of thought and thinking has spanned time. The Bible uses terms such as “think”, “meditate”, and “ponder” to describe the process God created that allows people to learn about Him. Scripture speaks of pondering, or the sustained, deep thinking that reveals important details as in Psalm 143:5 “I ponder the work of Your hands.” Scripture also clearly connects the ability to reflect and think for sustained amounts of time on truths as a trait of the wise. The Lord also instructs in Proverbs 4:26 to think deeply first before taking steps to ensure success, “Ponder the path of your feet, then all of your ways will be sure.” In Proverbs 15:28, one may see that, “The heart of the righteous ponders how to answer, but the mouth of the wicked pours out evil things.” The Lord emphasizes that the practice of strategic thinking prior to proceeding in many different situations is a sign of wisdom.

It is also clear that God intended the individual to be able to control his/her thoughts in 2 Corinthians 10:15, “Take every thought and purpose captive,” directing believers to choose to focus their minds on Him. Mediation, or the prolonged reflection and process of thinking deeply over an extended time, is also valued in Scripture. Numerous verses extol the value of meditating on God’s Word and His promises as a key for growth and understanding. Psalms 119:97-98 describes God’s law as our “meditation all the day,” and that it this practice that gives a person an advantage and makes one “wiser than my enemies.” Attributes of a wise person are described in Psalms 1:2, “His delight is in the law of the Lord, and in His law he meditates day and night.”
This idea of meditating is not merely a repetition of musings, but the diligent and intentional focus on Scripture for its wisdom through a process of reflection, self-application, and openness to the Holy Spirit.

**Early Interest in Metacognitive Strategies**

Using metacognition to improve learning has been met with interest by many disciplines. Metacognition is directly applicable in education, psychology, neuroscience, and various fields related to language learning. The roots of metacognition span back to the fields of cognitive psychology, cognitive developmental psychology, and social development psychology (Steinbach, 2008). Individuals of all ages must possess the ability to reflect and regulate their own thinking and behavior to support healthy psychosocial development, emotional wellbeing, academic achievement, physical health, and socioeconomic success (Murray, Rosenbalm, & Christopoulos, 2016).

While perhaps not specifically identified using the term metacognition, various theorists affiliated with education and child development have attempted to articulate the concept of cognitive control as an effective means to maximize learning. John Dewey (1933), a pioneer of the American education system, identified the importance of self-reflection in the thinking process, and the intentional and consecutive consideration to improve understanding. Piagetian concepts that identify the relevance of thinking behavior and its relationship to knowledge, contributed to the foundation of an understanding about thinking and human development (Steinbach, 2008). Vygotsky (1962) found that intentional control and awareness during the early
learning process were key to the development of higher order skills, particularly during a child’s early elementary stage.

As metacognition began to attract the attention of developmental psychologists in the 1970’s, the field of education also realized the benefit for learners. Now, four decades later, it is clear that learners who are most successful possess higher levels of metacognitive knowledge and can regulate their own thinking and problem solving processes (Baker, DeWyngaert, Seliger-Kandasamy, 2015). Metacognition has been described as the processes and the handling of information by an individual on his/her own behalf (Leader, 2008). Throughout the literature, the term “metacognition” has been used as a collective term describing a number of phenomena, behaviors, and experiences related to the awareness and intentional control of one's own cognitive activity including perception, learning, memory, understanding, and thinking (Hasselhorn & Labuhn, 2011).

Historically, researchers sought to define direct relationships about memory or processes, initially defined by Flavell & Wellman (1977) as meta-memory. The most commonly accepted definition of metacognition was generated by Flavell (1977) through his work involving children and their understanding of how to regulate their memories and cognitions. Flavell (1977) focused on the memory of children, and how memories were influenced or determined by their understanding of problem-solving strategies. This foundational model is considered the main basis for the concept of metacognition in contemporary research literature. In his later work, Flavell (1978) explored the learners’ knowledge about various attributes of the person, task, and strategy in order to organize metacognitive knowledge that might be critical for remembering.
Flavell (1979) connected his definition to self-regulated learning, using the phrase, “cognitive monitoring” (p.906). He defined a model of cognitive activity that used knowledge and experiences as coordinated by the learner (Flavell, 1979). In this model, metacognitive knowledge is classified according to three distinct aspects- strategies, self, and task- that support the successful completion of the learning activity (Flavell, 1979). Metacognitive experiences, as defined by Flavell (1979) are “items of metacognitive knowledge that have entered consciousness” (p.908). This evaluation may include an assessment of progress toward completion, or areas of confusion that are preventing the learner from achieving the goal. According to Flavell (1979), metacognitive experiences are added to an individual's knowledge base continually, with the potential to be used again in other contexts.

**Building on Flavell’s Early Work**

Building on Flavell's work, Brown (1978) suggested that metacognition was dependent upon an individual's cognitive abilities and the self-monitoring used during learning tasks. Brown (1978) continued studies that sought to understand the way information is used during the learning process. He proposed that metacognition was the awareness and organization of the thinking process that learners use in academic tasks (Brown, 1978). Further building upon the research base, Brown chose to focus upon aspects of executive function, such as planning, monitoring, and revision (1978). Ultimately, those two approaches have merged into an understanding that acknowledges the importance of thinking processes, as well as the executive aspects of metacognition (Wellman, 1985).
To further expand upon Flavell’s original model, Baker and Brown (1984) described the relationship between metacognitive skills and reading by suggesting that metacognition consists of two areas, knowledge and the intentional regulation of an individual’s cognition. Further studies refined this concept and described metacognition as being comprised of an individual's knowledge about their own cognition and the intentional monitoring of their cognition (Schraw & Dennison, 1994).

Brown (1978) also suggested executive control was a key part of metacognition. Executive control includes the use of planning, monitoring, verification, and revising by the learner. According to Brown, an individual must choose to reflect on his or her cognitive abilities to possess an understanding in the ways that learning is regulated (Bransford, Brown & Cocking, 1999). Describing metacognition as an individual’s awareness to choose specific strategies to facilitate and take responsibility of the personal learning process, Baker and Brown (1984) offered an illustration of a theoretical structure to the concept.

Kluwe (1982) further refined existing models by combining the ideas that Flavell and Brown had already suggested with the conceptualization of two additional types of metacognitive activities that involve a knowledge of self-thinking, as well as the thinking of others as a regulatory strategy. Kluwe (1982) suggested that knowledge of self-thinking can be broken up into two distinct types: declarative and procedural. Declarative knowledge is the understanding of self, the task, and its context in order to control one's own thought in relationship to a specific learning process. Procedural knowledge relates to the selection, application, and regulation of the learning process and its associated activities. According to
Kluwe (1982), this type of executive monitoring supports intentional acts of thinking on the learners’ part as a solution is pursued.

Paris (1988) went on to describe metacognitive knowledge as declarative, procedural, and conditional. According to Paris, Lipson, and Wixson (1994), knowledge deals with the stable, consistent understanding of the task, skill level, and the learner’s estimation of their ability to complete the task. Further research elaborated that the regulatory aspect of metacognition was more geared toward solving a problem that occurs during learning and the readiness to deploy an appropriate strategy (Baker & Brown, 1984).

Tobias & Everson (2002) discussed that former definitions of metacognition shared three major components. These components included a knowledge about metacognition, the monitoring of one's own learning processes, and the control of the strategies used by an individual to achieve success. Their subsequent exploration focused on monitoring as a key part of the metacognitive process, allowing these researchers to develop a model that emphasized the need for control to span across the areas of planning, strategy selection, and evaluation in order to achieve knowledge monitoring (Tobias & Everson, 2002). Metacognition was defined as a compound of skills and knowledge - knowledge of cognition, monitoring of one's cognitive and learning processes, and control of those processes. However, Tobias & Everson (2002) organize these components into a hierarchical model, where the metacognitive skill of knowledge monitoring is a pre-requisite for activating other metacognitive skills. They define knowledge monitoring as the ability of knowing what one knows and knowing what one does not know. If students cannot differentiate accurately between what they know and do not know, they can
hardly be expected to engage in advanced metacognitive activities, such as evaluating their learning realistically, or making plans for effective control of that learning. Learners who accurately differentiate between what has been learned previously and what they have yet to learn are better able to focus attention and other cognitive resources on the material to be acquired (Tobias and Everson, 2002).

Kuhn & Dean (2004) described metacognition as the process that allows a learner, who has acquired a particular strategy in a specific problem context, to use that strategy in a similar but new situation. It is helpful to understand that in cognitive psychology, the idea of metacognition is frequently described as executive control or self-regulation (Schneider & Lockl, 2008). Metacognition is also understood to be a multifaceted array of general skills, rather than domain specific abilities (Schraw, 1998). Metacognitive skills are different from basic intelligence, and may even work to compensate for a lower intelligence level during problem-solving when used by a proficient learner (Schraw, 1998).

To best attempt to explore metacognition, it is important to differentiate between the term and its root, cognition. While these concepts are clearly separate, there exists some overlap that is worth noting. Metacognition is needed to plan and execute a task, while cognition is needed to complete the task (Schraw, 2001). According to Haribhai (2012), cognition is the understanding of a topic, while metacognition is a subcategory of cognition comprised of an awareness of how the learning process takes place, in addition to the actual act of learning information. Cognition is needed to shape the process of learning, while metacognition is necessary to allow observation and evaluation of individual’s own processes and the transference of that understanding to new
situations (Gourgey, 1998). As a result, metacognition can be shown to be a foundational need in order to assign cognitive effectiveness and must happen during the planning, monitoring, and evaluation stages in a learning activity (Akturk & Sahin, 2011).

There has been an overlap with this terminology in the field of cognitive psychology supporting the development and refinement of additional descriptions of metacognition. According to Cross & Paris (1988, p.131), metacognition is described as, "the knowledge and control children have over their own thinking and learning activities." Kuhn & Dean (2004, p.270) offer the explanation that metacognition is, "awareness and management of one's own thought." According to Martinez (2006), the definition must not only refer to the monitoring of cognitive processes, but the applied control of those processes by the learner as well. Haribhai (2012) maintained that cognitive strategies are used to help an individual achieve a particular goal (e.g., understanding a text) while metacognitive strategies are used to ensure that the goal has been reached (e.g., quizzing oneself to evaluate how well a text is understood). This relationship between cognition and metacognition appears clearly and necessarily entwined, requiring both concepts to be actively engaging to mutually support successful learning and growth.

**Metacognitive Strategies**

Research suggested that learners who are metacognitively aware have developed the ability to plan, order, and monitor their learning progress to achieve optimal outcomes (Pang & Ross, 2010). Metacognitive monitoring permits opportunities to adjust or switch tactics to meet the constantly changing requirements of a problem-solving task (Muis, 2007). Other types of
metacognitive approaches that allow for monitoring include self-checking for errors, the ability to diagnose and make necessary corrections, self-testing, and questioning (Winne & Jameison-Noel, 2002).

Understanding the metacognitive strategies used by a learner, and how these strategies are involved with the thinking process and the ability to organize and ultimately evaluate these choices, aids in the understanding of the metacognitive process during learning (Wilson, 1998). Continued research has suggested and expanded metacognition’s definition to include the awareness and understanding of the process involved with the regulation of one’s own mental condition, memory, skills and behavior (Scarr and Zandon, 1984). Others, including Barell (1991), Metcalfe and Shimamura (1994) and Zhang (2001) have all expanded the term to include reflection, awareness, self-regulation in assessment, and executive function.

A learner’s knowledge refers to the understanding of strategies used to learn and think (Pintrich & Zusho, 2002), while “strategy” is defined as the procedure for accomplishing a task (Pressley and Ghatala, 1990). Metacognitive strategies are a learner’s knowledge of their own cognitive activity (Dignath, Buettner & Gerhard, 2008). Knowledge of tasks and their contexts includes different types of cognitive goals, as well, and the understanding of various types of environments or conditions that these strategies might be well used (Pintrich, 2002). Knowledge of self, or one’s own cognition, is one of the key pieces of successful meta-cognitive knowledge (Ellis, Bond, & Denton, 2012). Ideally, effective learners are aware of their own strengths and weaknesses in the learning process, and subsequently choose proper strategies to correspond appropriately to the task (Reid & Lienemann, 2006). To be successful, learners should master
several types of strategies and how, when, why, and where to apply them (Veenman, Van Hout Wolters & Afflerbach, 2006).

Most definitions of metacognition shared a commonality: the agreement that a central aspect includes the monitoring of strategies used throughout the learning process (Bonner, 1988). Borkowski, Chan, & Muthrishna (2000) suggested that successful metacognition is a blending of a learner’s knowledge of cognitive states and processes with the ability to execute aspects of the learning process as well. Key to the understanding of metacognition was the use of the intentional planning to approach a task prior to its completion, ongoing observation of suitable thinking strategies, the control and regulation of thinking, as well as self-evaluation of the process following completion (Scoot, 2008).

Self-regulation is another aspect of successful metacognition and is a combination of learners’ metacognitive strategies for planning, monitoring, and modifying their cognition, management of the process of completing classroom tasks, and the actual cognitive strategies employed to learn the target material (Pintrich & De Groot, 1990). Self-regulated learners are those who are effective in achieving their learning goals, and are aware and intentional in the use of metacognitive strategies needed to do so (Wolters, Pintrich, & Karabenick, 2003). Learners who demonstrate the ability to self-regulate show more refined metacognitive strategies and select, monitor, and regulate those strategies in a variety of academic tasks (Schunk, 2005). Self-regulated learning involves choosing to engage in “self-directed metacognitive, cognitive, affective, and behavioral processes and skills” (McCombs & Marzano, 1990, p. 52).
Metacognition and Literacy

Metacognition has been of particular interest in the support of learning across various academic content areas, but there has been particular interest of how metacognition may support literacy development. Researchers have explored the role of metacognition in reading, and the use of metacognitive strategies in the process as readers move toward the ability to be skillful in their literacy pursuits. Metacognitive strategies in reading include routines and procedures that allow readers to monitor and assess their ongoing performance in comprehending a text (Dole, Nokes, and Drits, 2009). Based on the research, metacognition and comprehension monitoring should be inherent in any instructional routines in literacy classrooms (National Reading Panel, 2000).

One of the most basic goals of literacy instruction is to produce skilled readers. Skilled reading encompasses much of the key features of metacognition (van den Broek & Kremer, 2000). Many aspects of reading are the result of an ongoing coordination of smaller components. Skilled reading is the interaction of various levels of processes that permits a reader to build an accurate picture of text (van den Broek & Kremer, 2000). Skilled reading involves the initial preparation to read, building meaning during reading, and reviewing and reflecting on the task upon completion (Pressley, 2002).

At the highest level, or macro level, the reader conducts such activities as summarization or gathers cues from the organizational structure of a text to build an understanding. At the lowest level, or micro level, smaller units of knowledge are used to make sense and used to decode words and connect phrases. To connect these processes, the reader is asked to make
sensible inferences and elaborations that correspond to prior understanding and ongoing information being obtained through the text (Raphael, 1986). Fluency and vocabulary processing is key to this process (Pressley, 2002). Attention is also important to this execution of literacy processes, and readers are also making decisions concerning what to attend to, what is more or less important, and how to focus on text that is challenging (Wade, Schraw, Buxton, & Hayes, 1993). Skilled reading breaks down without ongoing monitoring (Griffith & Ruan, 2005).

Another aspect of skilled reading is attentional capacity (Van den Broek & Kremer, 2000). Choices are constantly being made by readers to re-read, infer, recall and discard information, and what rate of reading to adopt (Pressley, 2002). According to Wade, Schraw, Buxton & Hayes (1993), each of these decisions during the reading task creates a selective allocation of cognitive resources.

The idea of skilled readers developing the ability to be critical readers has long burdened educators and researchers. Basic literacy permits a reader to access the lower levels of understanding, including comprehension, but critical literacy moves the learner into higher levels of analysis in a transformative direction (McDaniel, 2004). Critical literacy requires learners to continually monitor their understanding closely, an accepted metacognitive process. The act of self-monitoring during reading has been consistently understood to be crucial to the reading process (Pressley & Ghatala, 1990; Zimmernam & Paulsen, 1995). Readers who demonstrate critical literacy are likely to employ metacognitive strategies for text understanding and critique (McDaniel, 2004).
Instruction of Metacognitive Strategies

The goal of metacognition for skilled readers should be the expert use of metacognitive strategies to develop an awareness of metacognitive behaviors that can be used to improve the quality of self-regulation during a reading task. Instructional methods have been shown to be effective in prompting learners’ metacognitive development in the area of skilled reading and self-regulation. Such strategies focus on questioning, predicting, clarifying and summarizing in support of student connection and monitoring for greater understanding (Griffith & Ruan, 2005). Examples of effective strategies include reading collaboratively with the teacher (Palincsar & Brown, 1984), verbalizing thoughts while reading aloud orally (Baumann, Jones & Seifert-Kessell, 1993), and opportunities to engage in producing text based questions and answers (Raphael, 1986).

During early seasons of study, metacognitive strategy instruction contained strategy choice, modeling, guided practice, and peer collaboration (National Reading Panel, 2000). Students who received strategies intervention gained more in metacognitive knowledge, as well as reading comprehension than those who did not receive such intervention (Houtveen and van de Grift, 2011). Strategy instruction tends to be enhanced through a combination of approaches (Guthrie, Wigfield, Barbosa, Perencevich, & Taboa, 2004). Students who received training in multilevel strategies and were provided opportunities to practice these strategies showed greater gains in reading comprehension than those who did not receive this training (Vaughn, Klinger, Swanson, Boardman, & Rob, 2011). Approaches that include multiple strategies and working memory skill development show greater efficacy than traditional comprehension instruction,
particularly when using different training techniques (Carretti, De Beni, Romano, & Cornoldi, 2013).

According to available literature, metacognitive literacy instruction is most beneficial when it is focused on the development of student schema and developmentally appropriate metacognitive strategies, as well as supporting an understanding of conditions for selection of compensatory strategies (Griffith & Ruan, 2005). Self-regulation is an important strategy of metacognitive readers, and includes behaviors, such as confirmation, monitoring, assessment, revision, and evaluation (Griffith & Ruan, 2005).

Research clearly shows that metacognition strategies are able to be taught (Kramarski & Mevarech, 2003). Ericsson (2000) described metacognition as being a result of many variables that could also be strategically developed into expertise. This expertise supports not only the learner’s ability to acquire skill, but to also experience academic success (Ericsson & Smith, 1991). The direct instruction of meta-cognitive strategies increases academic achievement (Biggs, 1988). Instructional modeling is critical in the process of teaching metacognitive practices, particularly in self-regulation (Kramarski & Mevarech, 2003). Students who actively use their metacognitive skills are more aware of their strengths and weaknesses and typically focus efforts to improve their learning skills or work around their limitations more effectively (Bransford, Brown & Cocking, 1999). By improving the awareness and use of metacognitive skills, the learner can increase effectiveness in various academic contexts (Jones, Farquhar, & Surry, 1995).
In fact, early research on metacognition suggested that, “increasing the quality and quantity of children’s metacognitive knowledge and monitoring skills through systematic training may be feasible as well as desirable” (Flavell, 1979, p.906). This belief has been applied across content areas since its proposal. However, even early theorists suggested that metacognition is a late developing skill, with many high school and college students struggling to apply a mature skill set of strategies (Griffiths & Ruan, 2005).

Metacognitive Strategy Awareness, Instruction, and Reading Comprehension

Metacognitive awareness refers to the inner awareness, knowledge, management and control that readers’ have over the reading process (Cross & Paris, 1988). Metacognitive strategies are choices that originate from readers’ understanding of the demands of the text, the purpose for reading, and their ability to choose appropriate thinking strategies to complete their reading goals (Vellutino & Scanlon, 2002). There is a strong connection between learners’ metacognition and their reading comprehension (Baker & Brown, 1984). As research has emerged showing the importance of metacognitive strategies in reading, instructional approaches that include metacognitive training to help learners have been successful (Baker & Brown, 1984). Readers do not acquire a variety of cognitive and metacognitive strategies unless they are given detailed explicit instruction (Brown and Campione, 1990). Learners need direct instruction to fully understand a strategy and how to use it, and even more precise instruction in more complex strategies.

In the area of reading, comprehension monitoring is the control component identified in metacognition. It involves the reader determining if he/she understands what is being read, and
thus taking steps to correct or confirm an understanding of the content (Baker, 2002). As early research in metacognition built an understanding of key aspects of the process, educational researchers sought to use metacognition as a tool to determine how successful readers execute reading tasks (Baker, 2002). Various types of interventions emerged, focused on promoting metacognition within diverse classroom environments. Reading that is considered “engaged” is described as a combination of motivation, knowledge, strategies, and social interaction, and requires students to become selective and conscious of strategies that support their personal achievement (McCarthy, Hoffman & Galda, 1999).

Reading comprehension is the process of understanding and constructing meaning from text and is described as the essence of reading (Duffy, 2003). Reading comprehension may be affected by the reader’s background knowledge, vocabulary development, text level, and decoding difficulties, among other things. Comprehension involves the connection between the reader, the text, and the activity of the reading (Alvermann & Eakle, 2003).

Reading comprehension is considered to be the most important academic skill to be learned in school (Pressley, 2002) and holds the potential to impact content areas across the curriculum. Reading comprehension is a meaning-making process; whereby readers interact with print and make sense from the message as they acquire, create and confirm meaning (Gambrell, Block, & Pressley, 2002). When readers comprehend text, they are using prior knowledge to construct meaning, actively thinking, and continually monitoring for understanding, making and adjusting predictions, analyzing and making inferences, creating mental images, and reflecting
upon and evaluating what they have read (Duffy, 2003). Comprehension is an intricate activity that is continually regulated and supported by the metacognitive process.

Comprehension relies on the readers’ use of a variety of strategies, such as activation of background knowledge, questioning, summarization, organization, and identification of main ideas, prediction, self-monitoring, and inferring (Duffy, 2003). By the intermediate elementary grades, some readers begin to exhibit difficulties with reading comprehension (Duffy, 2003). Even though students may receive some level of strategy instruction, they may lack understanding about what the strategies are and how to effectively use them. Students need opportunities to see the strategies modeled, and to practice in order to increase their ability to use strategies appropriately (Duffy, 2003).

Lipson and Wixon (2013) described comprehension as complex process that connects readers to texts. Comprehension is the critical goal of reading (Gambrell, Block, & Pressley, 2002), and this happens when a reader can take and build meaning from a text (Snow & Sweet, 2003). Successful readers evaluate text, make decisions about how to handle the information presented, and combine a variety of strategies to accomplish skillful reading (Gambrell et al., 2002). Successful reading calls for high levels of cognitive and metacognitive effort (Paris et al., 1984). When readers comprehend, new information creates connections with their previous understanding, and they must intentionally interpret this new information in order for them to comprehend the text (Pearson & Anderson, 1984).

Within the context of metacognition and reading comprehension, strategies and skills are often identified as important parts of the process. Skilled readers match the appropriate strategies
to different learning situations, with a strategy understood as being an action intentionally selected from alternatives to achieve a specific goal (Paris et al, 1991). In earlier writings, Paris et al. (1991) described a skill as an action applied unconsciously and automatically. Higher achievers comprehend more when they use their own preferred strategies, while lower achieving students may benefit from learning specific strategies to choose from, and better readers become skillful at deploying the strategies that they choose to use (Dole, Brown, & Trathen, 1996).

To understand the relationship between metacognition and reading comprehension allows researchers to connect what cognitive processes good readers use to comprehend what they read. Reading comprehension research has identified numerous metacognitive processes involved in reading comprehension (Collins, Block, & Pressley, 2002). Early definitions of reading comprehension describe it as a complex process that involves the successful transfer of information graphically between two individuals, the reader and the author (Kingston, 1967). Reading comprehension has been additionally described as consisting of three distinct elements, the reader, the text, and the purpose for reading (Snow, 2002). Fluent readers must decode and comprehend words, as well as monitor comprehension using metacognitive processes in order to continually detect a breakdown or engage repair strategies as they are needed throughout the task (Samuels, 2006). Metacognition in reading has been an important goal of reading comprehension research in order to describe the cognitive processes used by effective readers (Baker, 2002). Research has shown that poor readers struggle with various missing pieces of the cognitive processes shown in successful readers, including vocabulary development and syntax issues, problems making inferences, inability to identify referent pronouns, failure to use context
clues, weak abstract thinking, and low comprehension and repair strategies (Cain, Oakhill, & Bryant, 2004). According to Dewitz & Dewitz, (2003), common errors in reading comprehension include a failure by readers to link ideas across passages, inability to make causal connections, lack of sufficient vocabulary knowledge, and poor parsing of syntax.

Throughout the current research base, several methods that emphasize metacognitive behaviors emerge as research based approaches that improve reading comprehension. According to the National Reading Panel (2000), these methods include strategy instruction, cooperative learning, graphic organizers, story structure description, question generating and answering, and summarization.

The use of metacognitive strategies and control in the reading process is often called comprehension monitoring (Baker, DeWyngaert, Zeliger-Kandasamy, 2015). Comprehension monitoring can be described as evaluating what one reads and taking the appropriate steps to regulate and ensure proper comprehension, and is used frequently by strong readers (Palincsar & Brown, 1984; Pearson & Fielding, 1991; Pressley, 2000). Research has continually demonstrated that metacognitive strategies can be taught to learners to help improve reading comprehension (Paris & Anderson, 1984; Paris, Wasik, & Turner, 1991). Although the typical goal of most instruction is content oriented, metacognitively based interventions are clearly effective in improving reading comprehension (Deluca & Nasim, 2013).

Strategic reading requires readers to plan, monitor, and evaluate their reading so they may meet their goal of comprehending the text (Paris et al., 1991). The process of planning involves the metacognitive behavior of selection of strategies in advance to help readers reach
their goals, while monitoring is the ongoing awareness and adjustment of those strategies and their effectiveness during the reading process. Evaluating occurs as readers analyze their reading performance with an awareness of the choice of strategies (Cross & Paris, 1988). Researchers have noted that an effective way to determine the level of an individual’s metacognitive awareness is to survey them (Baker & Brown 1984).

Strategy is an integral part of metacognition and reading. Readers who are considered successful have the ability to match correct strategies to various reading situations (Paris, et al, 1991). According to Paris, et al. (1994), a behavior becomes strategic when it is chosen from alternative to achieve a specific goal and becomes intentional and purposeful (Griffith and Ruan, 2005). With respect to being a skilled reader, Paris, et al. (1991) suggested that skills are processes applied automatically. The transition from basic literacy which focuses on literal text comprehension, to critical literacy, which emphasizes critical thinking, questioning, and transformative thought (McDaniel, 2004) generates an increased need for metacognitive strategies. Critical readers cannot just comprehend, they must analyze and connect relationships within the text and other disciplines, as well as their own understanding of any differences in the author’s position with respect to their own (Freebody, 2001).

Reading strategies help learners accomplish the processing of a text (Duke & Pearson, 2002). A reading strategy is made up of a series of strategic steps used to accomplish a specific reading goal (Collins, 1991). Readers use strategies when they plan, evaluate, and regulate their own reading behaviors to make sense of the text before, during and after reading. (Duffy, 1993).
Comprehension monitoring strategies help readers achieve cognitive purposes and are potentially conscious and controllable activities (Borkowski, Chan, & Muthukrishna, 2000).

Strategies used in the process of comprehension monitoring are constructed from various tactics and used by the learner to meet a specific goal, while monitoring for suitability (Wade, Trathen & Schraw, 1990). In addition, the researchers asserted that higher achieving readers comprehend material better when they are permitted to use their preferred strategies, demonstrating that the key to skillful reading is knowing which strategy to deploy and at what point. A child’s ability to choose and deploy reading strategies improves with reading ability and age (Ballou, 2012).

As recent research has addressed the impact of metacognitive reading strategies, several important conclusions have emerged. Dignath, Buettner, & Gerhard (2008) suggested that strategy instruction is much more efficient for students at the high school level than the elementary. The researchers suggested that older students may be better able to build upon prior metacognitive literacy strategies gained through early academic experiences. Alsheikh & Mokhtari (2011) emphasized the importance and power of using metacognitive strategies to support reading at the secondary level and beyond. As reading fluency develops and solidifies in older students, more cognitive resources become available and may be allocated to the development of metacognition and comprehension (Williams and Atkins, 2009).

It is clear that better readers have a high level of sophistication when it comes to their knowledge about reading, and can evaluate and regulate their comprehension better than less skilled readers (Baker, Smolkowski, Katz, Fien, Seely & Kame’enui, 2008). However,
metacognitive skills do not develop automatically, and those students low in such strategies in early grades, continue to have weaker skills throughout school (Roesel-Heils, Schneider & van Kraayenoord, 2003). Research indicates that metacognitive monitoring is relatively poor among college students (Theide, Griffin, Wiley & Redford, 2009).

Shaping learners’ ability to apply and reap the benefits of metacognitive skills through direct instruction is of particular interest to educators at all levels. The instruction of classroom-based interventions has been demonstrated to positively affect students’ metacognitive strategy use in reading (Dignath, et. al, 2008). According to Zimmerman (2002), instruction of metacognitive strategies should consist of three distinct phases that include the forethought phase, the performance phase, and the self-reflection phase. The forethought phase (self-assessment, goal setting, and strategic planning) involves analyzing the learning task and the setting of specific goals needed to complete the task. During the performance phase, strategy implementation and monitoring occurs during learning, and the self-reflection phase consists of the reflective evaluation of the actual learning outcome (Furnes & Norman, 2015). Adolescents’ ability to learn can indeed improve over time through repetition and application of learning strategies, followed by specific feedback (Blackwell, Trzesniewski & Dweck, 2007). While students need ample time to practice various strategies, time frames ranging from four sessions to daily instruction over an extended period of time have shown to be effective (Dignath et al., 2008).

**Verbal Strategies to Support Metacognition**
A foundational strategy to promote metacognition is the verbalization of the thinking process by the learner. Often called the “think-aloud”, this technique is a metacognitive strategy in which the teacher models the strategic decision-making and interpretive processes that a reader uses through talk and action, to make visible the metacognitive processes of successful learners (Wilhelm, 2001). The think aloud strategy has gained a great deal of traction as awareness of the value of instruction in metacognitive practices has emerged (Tovani, 2000). Teachers can help students learn to be thoughtful and strategic readers by demonstrating, through think-alouds, their own comprehension strategies and then allowing students to practice using the strategies and thinking aloud themselves (Israel & Massey, 2005).

Think aloud strategies have proven successful, not only in reading comprehension, but in a variety of content areas. In science classrooms, think alouds were an effective tool for producing a higher level of understanding among students who were presented with instruction that utilized the think aloud method than those who were not (Jackson, 2016). Other areas, such as second language learning classrooms, have also shown success with the think aloud strategy (Beena, 2010). Think aloud strategies have produced significant positive outcomes in math and problem solving contexts as well (Bernadowski, 2016).

In reading research, although the use of think-aloud protocols as a source of data and verbal protocol analysis as a research tool was criticized for potential limitations related to interference in the cognitive process, researchers now generally agreed that once care is taken, the think-aloud method can be one of the best means to elicit sufficient and reliable data for studying readers’ invisible metacognitive awareness and strategy use (Zhang, 2008). In fact,
thinking aloud and protocol analysis have been used widely in the research on reading with much empirical evidence that supports their validity (Wang, 2016).

**Writing to Support Metacognition**

While significant energy has been spent on the study of metacognition in reading comprehension, less research is available about the use of writing as a metacognitive strategy in support of literacy. The ideas of reading and writing are often considered complementary processes that involve planning, goal setting, accessing prior knowledge, organization, strategy implementation, and evaluation (Tomkins, 2003). Langer (cited in Booth 2003) noted that meaning happens more consistently during writing because the writer must constantly generate new text. According to Flower & Hayes, (cited in Booth 2003) readers are focused on creating their understanding of the text in relationship to the author’s message; the writing process requires the outcome to satisfy a threefold goal that includes the writer, the reader, while still following the guidelines of written language.

Writing is not only a method of communication, but also a way of learning (Oates, 2000). An understanding of the importance for writing to support learning is rooted in the 1970’s through work pioneered by Britton, Emig and Moffett (Tynjala, 1998). Britton and Emig both conducted research and suggested that individuals organize their experience and understanding through language, and that writing is key to exploring and expressing ideas (Oates, 2000). Emig built upon Britton’s concepts by describing how the writing process allows individuals to represent learning in three distinct ways by using the hand to create, by creating a representation of an image through sight, and by restatement of concepts in words originated from the brain...
(Emig, 1977). Writing produces the continual opportunity for re-emphasis and results in a multi-representational mode of learning (Emig, 1977). The process of writing is also noted as engaging both hemispheres of the brain and producing an intentional context for meaning (Oates, 2000).

The use of writing in the learning process was described as critical for knowledge development. Writing creates a permanent record and allows rethinking and revision, it forces the writer to create clear meaning applicable to various contexts in an organized fashion, and demands active thinking to explore implications and assumptions (Langer & Appleby, 2007). Quitadamo and Kurtz (2007) conducted a study that indicated that learners who were instructed to write in response to their learning significantly improved skills demonstrating critical thinking, analysis, and inference when compared to a non-writing group. Numerous studies have focused on how writing within disciplines helped students to learn content and how to think, creating opportunities to demonstrate deeper analytical and critical thinking skills (Daempfle, 2002).

Research suggested three distinct purposes of writing that included the preparation of students to learn new material by articulating pre-existing understanding, the consolidation and review of new information, and the reshaping and extension of knowledge (Langer and Appleby, 2007). Different types of writing can support different types of learning, and reflective writing helps to organize schema and set a context for the construction of understanding. Langer & Appleby (2007) reported that as students write during a task, they engage in making connections between various parts, questioning certain elements, create metacognitive responses that guide
the process of completion, and identify connections between the content and their own experiences. The power of writing is clear; engaging in writing leads to content manipulation and results in additional learning (Langer and Appleby, 2007).

Studies measuring the efficacy of personal analytical writing on learners’ writing processes found that learning was significantly higher in situations that required students to complete a task that involved personal analytical writing than those involving more restricted types of writing (Marshall, 1984). The cognitive processes involved in the stages of comprehension (pre-reading, guided reading, and post-reading) are virtually the same as the cognitive processes involved in effective analytical writing (Jacobs, 2002). Additional research affirmed that specific writing activities have a strong impact on the strength and organization of a learner’s knowledge (Newell, 1987). Writing in response to reading was found to be a meaning-making processes that can help learners achieve instructional goals and promote a stronger understanding of content (Jacobs, 2002).

In research involving learners writing at higher levels of analysis about a specific task, the opportunity to monitor comprehension, identify structure and connections between relevant information, helped to create a more meaningful learning experience (Bereiter and Scardamalia, 1992). Students who wrote in support of learning monitored comprehension more carefully than those who did not engage in writing activity during a task (Oates, 2000). Students who had to struggle to create a new structure and connections among information pieces were said to be engaging in knowledge transformation, as opposed to merely knowledge expression. By viewing writing as a knowledge transforming activity, learners gained more understanding by not merely
retelling their knowledge, but by engaging in writing that requires analysis of understanding and the creation of new knowledge structures to express that understanding (Oates, 2000).

A constructivist perspective of knowledge was the foundation for Tynjala’s research on writing and learning (1998). According to this perspective, assessment methods that focused on the learning process itself, and that support students’ metacognitive activities, are potentially most compatible with producing meaningful learning (Biggs, 1996). The most effective curricula presents general aims and develops student’s metacognitive abilities (Tynjala, 1998). As learning is considered the active building of understanding, research consistently found that writing completed by students in response to content instruction produced better learning outcomes than students who were not required to write (Tynjala, Mason & Lonka 2012). Writing to communicate subject matter competencies is a key aspect of knowledge transformation (Scardamalia and Bereiter, 2006).

Writing as a method to specifically support the process of reading comprehension is discussed somewhat less in the literature, but studies that do exist show promising outcomes for learners who use writing to monitor their metacognitive behaviors during various tasks. In particular, numerous studies that explored the impact of writing descriptions of thinking during mathematical problem solving have shown that students who use this approach are significantly more successful than those who merely verbalized their thinking (Pugalee, 2004). Mathematician George Polya’s (1957) early research showed the concepts of planning, self-monitoring, and reflection as highly influential in the process of problem solving. Garofalo & Lester (1989) built on Polya’s early work by suggesting that reflection not only involved the checking of success but
also an evaluative look at the process and its efficacy to achieve the task. Further studies by Schoenfeld (1987) concluded that planning and self-monitoring were critical behaviors necessary for success in problem solving. Studies have shown that when mathematical problem solving steps are articulated using written words, they are more available for reflection, monitoring, and self-evaluation (Gray, 1991).

As the literature showed, writing is an invaluable tool to the learning process. Writing has the ability to provide a sustained interaction with the material being presented, and generates the need for students to reframe and articulate deeper understanding of material and processes. Metacognition is the active engagement with the cognitive management of a learning task, and may be enhanced by the use of writing to make the metacognitive activity used in task completion more meaningful.

**Chapter Summary**

Metacognition, or an individual’s ability to think about one’s thinking, is a concept that has truly spanned time. The value of metacognitive practices for learners is clear, however, education is still exploring the specific types of strategies that produce the most impact for students. Through an examination of the literature, strategies that have been shown effective include both the verbal and written support of thinking behavior during a learning task. It is this understanding of the value of writing and speaking to support the metacognitive process of learning that provides the foundation for the following study of the use of metacognitive skills by students. Through the strategic instruction of metacognitive skills and the framing of their use using the writing process, this study will explore if the use of written monitoring of
metacognitive choices through a reading comprehension task will result in better academic performance compared with merely a verbal interaction with metacognitive practices. The following chapter will detail the overall structure and methodology of this study which was conducted to compare types of metacognitive strategy application on the secondary level.
III. METHODOLOGY

The General Perspective

This study was a quantitative, quasi-experimental pre and post-test design between two groups to better understand the impact of metacognitive strategy instruction in a 10th grade high school English Language Arts (ELA) classroom. Each group received instruction specifically addressing metacognitive and reading comprehension strategies that support the reading process. One treatment group received specific instruction of metacognitive strategies that were verbal in nature, while the other treatment group received instruction focused on both verbal and written metacognitive strategies.

Prior and following the training, both groups were administered a sample ACT reading passage test with related comprehension questions and a survey instrument to measure frequency of use of metacognitive and reading comprehension strategies. Scores were compared between the two groups, and a variety of analyses occurred which will be detailed in Chapter 4.

The Research Context

This study took place in a private Christian, college preparatory high school in Clearwater, Pinellas County, Florida with students in a 10th grade English Language Arts (ELA) classroom.

The Community

Pinellas County’s population numbers over 900,000 people, with a median age of 47.0 years old and an average annual household income of $40,425. The racial composition is 71%
white, 14% Latino/Hispanic, 11% African American, and 4% other. Of Pinellas County’s residents, 56% are homeowners, with 44% of residents living in multi-family housing. Private school students make up 13.7% of the entire school aged population, with a total of 16,478 students K-12 attending a private school in Pinellas County (Demographics Pinellas County Florida, 2017).

The Research Site

The school is accredited through the Association of Christian Schools, International, the Florida Council of Independent Schools, and the Southern Association of Colleges and Schools, and is located on the central West Coast region of Florida in Northern Pinellas County. It is currently in its 18th year of operation, and serves students in grades 9-12. The school defines itself as a private, college preparatory, Christian high school operating as an independent mission of a local church. Core courses have traditional and honors options delivered in an 8 period school day. There are 508 students enrolled in grades 9-12. The research site has a total of 45 full time faculty members, 15 with advanced degrees. The student to faculty ratio averages 10:1, and the average academic class size is 22. Students in attendance represent a range of economic backgrounds, with 12.4% being students of color. The school population is made up of 48.6% female, and 51.4% male students.

The Classroom

The secondary English Language Arts classroom where the research was conducted serves students enrolled in English 2 at the sophomore level. The course is taught by a full time female teacher who has 8 total years of classroom experience and holds a B.S. in English
Education with a minor in Communications. The instructor is certified by the State of Florida to teach English 6-12, and holds an English for Speakers of Other Languages (ESOL) endorsement. She is also certified to teach at the secondary level through the Association of Christian Schools, International.

The classroom is contained within the main building of the school’s campus, and has an estimated capacity of approximately 25 students. The physical conditions of the classroom during the research would be described as excellent, well lit, comfortably air conditioned, and clean. Students were seated in individual desks and chairs. The classroom teacher remained present but seated at her desk throughout the research.

Participants

Participants were 47 English 2 students enrolled in 10th grade at the research site. The average age of the participants was 15 years old. The treatment group receiving verbal strategy instruction group contained 18 female and 7 male students, while the treatment group receiving a combination of written and verbal strategies contained 15 females and 8 males respectively. The participants were generated from a convenience sample consisting of two English II classrooms taught by the same instructor during class periods that were compatible with the researcher’s availability. The sample was a convenience sample of students in English 10 Honors based on the most recent standardized test scores available. Placement in the English II Honors designation is based on the student receiving a minimum grade of 90 in English 1 Honors, satisfactory Preliminary Scholastic Aptitude Test (PSAT) scores of 50th percentile or higher, and
a positive teacher recommendation. The participants received no additional prior explicit training in reading metacognitive strategies.

Permission to conduct the research was given by school administration at the site, and consent to participate was received from the guardians of all participants (See Appendix A). Approval to conduct the research for this study was given by Southeastern University’s Independent Research Board (IRB).

**Timeframe of Study**

The research was conducted in an English 2 Honors classroom over a series of 12 daily sessions spanning from Monday, March 27, 2017 through Wednesday, April 12, 2017. These sessions included two sessions devoted exclusively to the administration of pre and post testing and pre and post survey completion by participants. Due to scheduling conflicts for the researcher, one session slated for April 6th, 2017 was rescheduled for the following day. These sessions were conducted by the researcher in the beginning of each regularly scheduled class meeting for approximately 10 minutes.

**Instrumentation**

The participants were divided into equivocal treatment groups. All participants were given a pre-test and post-test consisting of an abbreviated *American College Testing* (ACT) reading passage. The well-known ACT is a standardized college readiness test for high school achievement and college admissions in the United States produced by ACT, a nonprofit of the same name. Over three million students take the ACT each year according to the test publisher. (act.org).
The full ACT Reading Test is a four section, 40-item, 35-minute test that measures reading comprehension as a product of skill in referring and reasoning. Each section contains one long or two shorter passages that represent the level and text type typically found in first year college courses. These passages are organized by headings that identify the type, author and any contextual information about the text that would be relevant to the reader (act.org).

In addition to the passage, each section was followed by a set of multiple choice test items that focus on the supportive skills readers must utilize to comprehend written materials across the curriculum. These passages do not test any memorized facts related to the passage or its topic, rules of formal logic, or isolated vocabulary questions (act.org).

Students read and interact with several texts by referring to what is explicitly stated and determine inferred meaning. Items require students to infer main ideas, identify significant details and understand text sequences, make comparisons and understand cause and effect relationships, determine the meaning of terms in context, draw generalizations, and identify and analyze the voice or methods of a narrator or author (act.org).

The ACT reading passage used for this study was selected due to its categorization by ACT, Inc. as a “Literary Narrative” reading comprehension passage. While the four sections in the full ACT Reading Test are categorized by passages representing literary narratives, social sciences, humanities, and natural sciences, the researcher chose to focus exclusively on the literary narrative samples to protect against any inconsistency in cross content background of the participants. Both pre and post tests for reading comprehension consisted of one ACT produced reading comprehension passage followed by 10 multiple choice questions. These passages were
accessed through the ACT, Inc. publication that provides students with practice tests for this standardized instrument. The responses were scored against the answer key provided by ACT, Inc.

Following the reading comprehension pretest and post-test, each group was also administered the Metacognitive Awareness of Reading Strategies Inventory, also referred to as the MARSI (Mokhtari & Reichard, 2002). The MARSI is a self-report instrument for students with grade equivalents ranging from fifth grade through college (Mokhtari & Reichard, 2002). This inventory is designed to assess the perceived use of reading strategies while reading academic or school related materials (See Appendix B). The tool assesses 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 has when faced with an academic reading task (Mokhtari & Reichard, 2002). It contains 30 statements regarding reading strategy use to which students respond using a 5-point Likert type scale from 1 (I never do this) to 5 (I always do this). The MARSI has three strategy sub-scores: Global Reading Strategies, Problem-Solving Strategies, and Support Reading Strategies (Mokhtari & Reichard, 2002). Student scores are grouped into average scores for the three areas as well as an overall score.

The MARSI was developed with the help of three expert judges experienced in teaching and assessing reading strategies and was distilled down from 70 questions. MARSI has been demonstrated as a valid and reliable measure for assessing student comprehension monitoring (Mokhtari and Reichard, 2002). The MARSI was validated using a large native speaker population (N=825) consisting of students with reading abilities ranging from middle school to
college. The internal consistency reliability coefficients as determined by Cronbach’s alpha for its three subscales, which were based on the results of a series of factor analyses, were Global Reading Strategies (.92), Problem Solving Strategies (.79), and Support Strategies (.87). The overall reliability for the scales was .93, indicating a reasonably dependable measure of students’ metacognitive awareness of reading strategies. (Mokhtari and Sheorey, 2002).

**The Procedure**

Following the pre-test and survey, the individuals involved in the study participated in daily enrichment sessions for approximately 10 minutes each day, that offered metacognitive and reading comprehension strategy instruction. The verbal strategies treatment group received training that focused on metacognitive strategies, but were limited to a verbal implementation of these strategies in practice. The treatment group receiving instruction in both verbal and written strategies was encouraged to practice their strategy using both verbal demonstrations of strategy as well as written documentation of strategy. To help protect against accidental written responses to the instruction of strategies, the verbal strategy group was directed to not have any type of writing utensil in their hands as they were completing the tasks associated with instruction.

**The Intervention**

The preliminary session conducted by the researcher involved a brief introduction of the purpose, format, and duration of the enrichment sessions to the participants. A script was created to ensure similar instructions were given to both groups. The participants were also reminded that their performance would have no impact on their course grade whatsoever, and that their participation was voluntary and confidential.
During the preliminary session, both groups were given the ACT reading passage, and read a script informing them of the task. The participants had approximately 20 minutes to complete the reading which included a reading comprehension passage and 10 text based multiple choice questions. When the participants were done, their responses were collected and scored. Following that pre-test, the participants were given a copy of the Metacognitive Awareness of Reading Strategies Inventory (MARSI) survey to complete. Again, a script explaining the format and instructions was read to the participants. The survey was completed and collected for scoring.

The preliminary session was followed by ten individual daily sessions that instructed participants about various reading comprehension strategies assessed by the MARSI. Both groups received the same instruction, however, the verbal strategies group was limited to the practice and application of the strategies solely to verbal implementations of the strategies that were being taught. For example, to summarize a section of the text, students were asked to verbally articulate their summary only using spoken words to a nearby classmate. The second treatment group was permitted to not only process their learning task management verbally, but also were directed to write in response to their thinking process. In reference to the previous summarization example, the treatment group receiving instruction in both verbal and written strategies would be permitted to not only discuss their summaries with a classmate, but also wrote down their summaries on the paper containing the reading passage.

Instruction for both groups centered on the global, support, and problem solving strategies used to promote reading comprehension that could easily be implemented by the
participants during a similar reading task (See Appendix C). Each session addressed 3-4
strategies through the introduction, modeling, and application process. The researcher used two
different passages throughout the intervention as the foundation for the instruction, neither of
which was the pre or post-test passage. Students were presented with the strategy which was then
modeled by the researcher using the text sample. Participants then practiced the application of
the strategy to the sample passage. The researcher circulated to permit checks for understanding,
and the whole group discussed responses to which the researcher gave feedback that confirmed
the practice was successful, clarified the application of the strategy, or corrected participants’
understanding of the strategy in use (See Appendix D).

Following the ten sessions, both groups were again given a post-test consisting of a
different ACT reading passage and read a script informing them of the task. The participants had
approximately 20 minutes to complete the reading which included the new reading
comprehension passage and 10 text based multiple choice questions. When the participants were
done, their responses were collected and scored. Following the post-test, the participants were
again given a copy of the Metacognitive Awareness of Reading Strategies Inventory (MARSI)
survey to complete. Again, a script explaining the format and instructions was read to the
participants. The survey was completed and collected for scoring.

At the commencement of the intervention, the researcher expressed her appreciation to
the participants and reminded them that their performance and participation was confidential,
had no impact on their course grade, but was being used for a study involving reading strategies.
A brief time was permitted for questions by the participants, and the researcher fielded basic
questions about the study, its purpose, and what might be learned from the outcome. Administration was notified that the intervention sessions were over and that data collection was complete.

**Data Analysis**

Study data were analyzed using descriptive, inferential, and associative/predictive statistical techniques to address formally stated research questions and hypotheses. Prior to the address of the study’s research questions and hypotheses, analyses of a preliminary nature were conducted.

**Preliminary Analyses**

The data set was largely intact with missing data evident at an insignificant level. The Pre Test mean scores of both treatment groups were analyzed for statistical significance of difference using the *t-test of Independent Means* test statistic. Internal consistency (reliability) of participant response to the study’s primary research instrument was evaluated using the *Cronbach’s Alpha (a)* test statistic. The statistical significance of *Cronbach’s Alpha* findings was assessed using the *F Test*.

**Research Questions and Hypotheses**

In Research Question #1, mean scores were derived from Pre Test and Post Test comparisons. The mean score difference for each respective treatment group was used for evaluative purposes in addressing the specific question. The Research Hypothesis (H_a) for Question #1 was addressed using the *t-test of Dependent Means*. The Alpha level of *p < .05* represented the threshold for the evaluation of statistical significance of finding.
In Research Question #2, mean scores from each treatment group were utilized from the Post Test condition for comparative purposes. The Research Hypothesis (H_a) for Question #2 was addressed using the *t-test of Independent Means*. The Alpha level of *p* < .05 represented the threshold for the evaluation of statistical significance of finding.

Research Question #3 involved a comparison of mean scores within respective treatment groups in a Pre Test to Post Test manner. The Research Hypothesis (H_a) for Question #3 was addressed using the *t-test of Dependent Means*. The Alpha level of *p* < .05 represented the threshold for the evaluation of statistical significance of finding.

In order to assess Question #4, mean scores from each treatment group were utilized from the Post Test condition for comparative purposes. The Research Hypothesis (H_a) for the question was specifically addressed using the *t-test of Independent Means*. The Alpha level of *p* < .05 represented the threshold for the evaluation of statistical significance of finding.

In Research Question #5, mean scores from each treatment group were utilized from the Post Test condition for comparative purposes with regard to each of the three Sub-Scales. The Research Hypothesis (H_a) for Question #5 was addressed using the *t-test of Independent Means* for all three comparisons. The Alpha level of *p* < .05 represented the threshold for the evaluation of statistical significance of finding.

In Research Question and Hypothesis (H_a) #6, the focus of analysis was upon the determination of the mathematical associative and predictive relationships. The associative mathematical relationship of the study Sub-Scales with participant reading achievement and by respective treatment group was accomplished using the *Pearson Product-Moment Correlation*
The evaluation of the predictive abilities of respective Sub-Scales with regard to participant reading achievement by treatment group was accomplished using the Linear Regression statistical technique. *Beta* values (unstandardized) and *t* values were utilized to assess predictive robustness and statistical significance of the respective predictive slope lines. The Alpha level of \( p < .05 \) represented the threshold for the evaluation of statistical significance of predictive finding in addressing the research hypothesis.

**Chapter Summary**

Exploring the role of metacognitive strategies that are used during reading comprehension tasks is well suited for quantitative study. Chapter 3 offered an examination of the research process including participant selection, instrumentation, intervention structure, data collection and analysis.

Data collection and analysis focused on six research questions pertaining to the frequency of use and the impact of metacognitive strategy usage on academic performance. In addition, the research questions compared efficacy of metacognitive reading comprehension strategies that were verbal in nature, to a combination of both verbal and written strategies. The research design followed the recommendations made by Gay, Mills, & Airasian (2010) regarding quantitative studies.
Chapter 4 will offer the description, analysis, and data pertaining to the study. It will be organized around each individual research question, and a brief discussion and explanation of the findings will be presented.
IV. RESULTS

Preliminary Analyses

Prior to formally addressing the stated research questions of the study, preliminary analyses were initiated with the study’s data set. Specifically, missing data, and internal consistency (reliability) of participant response/performance were evaluated for fitness and illustrative purposes.

Missing Data

The study’s data set was intact for 98% of the participants identified for inclusion in the study. The total participant pool numbered 47. Of the total, slightly over half of study participants (51%) received verbal metacognitive strategies, with the remaining 49% receiving both verbal and written metacognitive strategies.

Internal Consistency (Reliability)

The overall level of internal consistency of response/performance of participants to the study’s research instrument is considered “high” \((a > .80)\) for both treatment groups. Table 1 illustrates the level of internal reliability for both participant groups.

Table 1

<table>
<thead>
<tr>
<th>Overall Internal Reliability by Treatment Group</th>
<th>(a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment Group</td>
<td></td>
</tr>
<tr>
<td>Verbal Strategies</td>
<td>.84***</td>
</tr>
<tr>
<td>Verbal &amp; Written Strategies</td>
<td>.93***</td>
</tr>
</tbody>
</table>

***\(p < .001\)
Regarding the research instrument’s “Sub-Scales”, the treatment group exposed to both verbal and written metacognitive strategies demonstrated higher levels of internal reliability across all three Sub-Scales. Table 2 summarizes the level of internal reliability for both participant groups with respect to research instrument Sub-Scale:

Table 2

<table>
<thead>
<tr>
<th>Treatment Group</th>
<th>Global Sub-Scale</th>
<th>Problem Sub-Scale</th>
<th>Support Sub-Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbal Strategies</td>
<td>.66***</td>
<td>.74***</td>
<td>.79***</td>
</tr>
<tr>
<td>Verbal &amp; Written Strategies</td>
<td>.87***</td>
<td>.80***</td>
<td>.81***</td>
</tr>
</tbody>
</table>

***p < .001

Research Questions and Hypotheses

To address the study’s research problem, the following research questions were specifically stated.

Research Question #1

Considering participant use of overall reading strategies, will participants who received verbal metacognitive strategies and participants who received a combination of both verbal and written metacognitive strategies manifest increases in their frequency of use of those strategies?

Students exposed to both verbal metacognitive strategies and the combination of verbal and written strategies manifested statistically significant increases in perceived frequency of strategy use from the Pre Test to the Post Test condition of the study.

Table 3 contains a summary of the finding for Research Question #1:
<table>
<thead>
<tr>
<th>Treatment Group</th>
<th>Mean Score Difference</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbal Strategies</td>
<td>.26</td>
<td>4.52***</td>
</tr>
<tr>
<td>Verbal &amp; Written Strategies</td>
<td>.21</td>
<td>2.94**</td>
</tr>
</tbody>
</table>

**p = .006     ***p < .001

Research Hypothesis #1 (H₀₁)

Both metacognitive strategies utilized in the study will promote statistically significant increases in participant perceived use of the respective strategies.

In light of the statistically significant findings for both metacognitive strategies employed in the study, the Alternative Research Hypothesis (H₀) for Question #1 is retained.

Research Question # 2

Considering participant use of overall reading strategies, is there a difference between students who received verbal metacognitive strategies and those participants who were exposed to a combination of both verbal and written metacognitive strategies in their frequency of use of those strategies?

Study participants receiving the verbal metacognitive strategies demonstrated a .05 mean score difference than their peers who were exposed to the combination of both verbal and written metacognitive strategies. The mean difference of .05 between the two treatment groups was not found to be statistically significant ($t_{(58)} = 0.94; p = .35$).
**Research Hypothesis #2 (H₂)**

*Participants exposed to both verbal and written metacognitive strategies will manifest statistically significantly greater levels of frequency of strategy usage than their peers who have received only verbal metacognitive strategies.*

In light of the finding in Question #2 favoring the treatment group exposed to only verbal metacognitive strategies, the Alternative (H₃) research Hypothesis is rejected.

**Research Question #3**

*Considering participant respective reading comprehension achievement, will there be an increase in achievement level with participants receiving verbal metacognitive strategies and with those participants who have received a combination of both verbal and written metacognitive strategies?*

Participants receiving both verbal metacognitive strategies and the combination of verbal and written strategies manifested statistically significant gains in reading achievement from the Pre Test to the Post Test condition of the study.

Table 4 contains a summary of the finding for Research Question #3:

| Table 4 Comparison of Reading Achievement Increase by Participant Strategy Type |
|---------------------------------|-----------------|-------|
| Treatment Group               | Mean Score Difference |   t   |
| Verbal Strategies             | 2.46             | 4.15***|
| Verbal & Written Strategies   | 1.30             | 2.95**|
**p = .007    ***p < .001

Research Hypothesis #3 (Hₐ 3)

Participants receiving both metacognitive strategies will demonstrate statistically significant increases in reading achievement.

In light of the statistically significant findings for both metacognitive strategies employed in the study regarding reading achievement, the Alternative Research Hypothesis (Hₐ) for Question #3 is retained.

Research Question #4

Considering participant respective reading comprehension achievement, will there be a difference in achievement level with participants receiving verbal metacognitive strategies compared to those participants who have received a combination of both verbal and written metacognitive strategies?

Participants receiving the verbal metacognitive strategies only demonstrated a .46 mean score difference greater than their peers who received the combination of both verbal and written metacognitive strategies. The mean difference of .46 between the two treatment groups was not found to be statistically significant ($t_{(45)} = 1.06; p = .30$).

Research Hypothesis #4 (Hₐ 4)

Considering participant reading comprehension achievement, there be a statistically significant difference in achievement level with participants receiving verbal and written metacognitive strategies compared to those participants who have received only verbal metacognitive strategies.
In light of the finding in Question #4 favoring the treatment group exposed to only verbal metacognitive strategies, the Alternative (Hₐ) research Hypothesis is rejected.

**Research Question #5**

*Considering metacognitive strategy use within the three respective Sub-Scales, which strategy will exert the greatest influence upon participant perceived frequency use of metacognitive strategies?*

Findings for impact of metacognitive strategy upon participant perceived frequency of use within the Sub-Scales are mixed. For the “Global” Sub-Scale, verbal metacognitive strategies appear to have exerted the greatest impact upon mean increase in participant perceived frequency of use (.40; p < .05), whereas in the “Problem” and “Support” Sub-Scales the verbal and written metacognitive strategies exerted the greatest influence upon participant mean difference in perceived frequency of use.

Regarding comparisons of participant performance by treatment group and individual Sub-Scale, Table 5 summarizes the respective findings:
Table 5

Comparisons of Participant Performance by Treatment Group and Individual Sub-Scale,

<table>
<thead>
<tr>
<th>Sub-Scale</th>
<th>Mean Difference</th>
<th>$t$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global</td>
<td>.40 (Verbal)</td>
<td>2.30*</td>
</tr>
<tr>
<td>Problem</td>
<td>.07 (V &amp; W)</td>
<td>0.46</td>
</tr>
<tr>
<td>Support</td>
<td>.15 (V &amp; W)</td>
<td>0.77</td>
</tr>
</tbody>
</table>

*p = .03

Research Hypothesis #5 (Hₐ 5)

Considering metacognitive strategy use within the three respective Sub-Scales, the combination of verbal and written strategy will exert the greatest influence upon participant perceived frequency use of metacognitive strategies.

In light of the finding favoring the combination of verbal and written metacognitive strategy in two of the three Sub Scales, the Alternative (Hₐ) research Hypothesis is retained.

Research Question #6

Regarding the methods of metacognitive strategy instruction, which of the three sub scales represents the most robust correlate and predictor of participant reading comprehension achievement?

The mathematical relationships for both treatment groups with the “Global” Sub-Scale and participant reading achievement are considered “weak” ($r < .20$). With regard to the other two Sub-Scales, the relationships are considered slightly beyond “weak” and approaching
“moderate”. The relationships for the treatment group exposed to verbal metacognitive strategies only are uniformly “inverse”, whereas the relationships for the treatment group exposed to both verbal and written metacognitive strategies are “direct”.

Table 6 illustrates the associative mathematical relationship of research instrument Sub-Scales with participant reading achievement by respective treatment group:

Table 6

<p>| Correlation Coefficients for Relationship between Sub-Scales and Reading Achievement |
|-----------------------------------------------|----------------------------------|-------------------------------|------------------------|</p>
<table>
<thead>
<tr>
<th>Treatment Group</th>
<th>Global Sub-Scale</th>
<th>Problem Sub-Scale</th>
<th>Support Sub-Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbal Strategies</td>
<td>-.16</td>
<td>-.26</td>
<td>-.30</td>
</tr>
<tr>
<td>Verbal &amp; Written Strategies</td>
<td>.15</td>
<td>.28</td>
<td>.25</td>
</tr>
</tbody>
</table>

Regarding the predictive abilities of the research instrument’s Sub-Scales, none of the three Sub-Scales represented statistically significant predictors of participant reading achievement in either treatment category. Sub-Scales represented “inverse” predictors of participant reading achievement for the treatment group exposed to only verbal metacognitive strategies, whereas the Sub-Scales for the treatment group exposed to both verbal and written strategies represented “direct” predictors of participant reading achievement.

Table 7 illustrates the predictive abilities of respective Sub-Scales with regard to participant reading achievement by treatment group:
Table 7

Comparison of Regression Weights (β) for Sub-Scales Predicting Reading Achievement by Treatment Group

<table>
<thead>
<tr>
<th>Treatment Group</th>
<th>Global Sub-Scale</th>
<th>Problem-Sub-Scale</th>
<th>Support-Sub-Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbal Strategies</td>
<td>-0.63</td>
<td>-0.87</td>
<td>-0.81</td>
</tr>
<tr>
<td>Verbal &amp; Written Strategies</td>
<td>0.22</td>
<td>0.47</td>
<td>0.39</td>
</tr>
</tbody>
</table>

Research Hypothesis #6 (H₆ 6)

At least one of the three Sub-Scales will represent a statistically significant correlate and predictor of participant reading achievement for each treatment group.

In light of the absence of statistically significant correlates and predictors amongst the study’s Sub-Scales, the Alternative (H₆) Research Hypothesis is rejected.

Summary of Chapter 4

Chapter 4 provided a preliminary analyses of the data set, and described internal reliability as high for the study’s instrumentation. Results of data analysis for each of the six research questions were presented and discussed. In each case, the alternate hypotheses were described as either retained or rejected.

Chapter Five will offer a more expansive discussion of the results, research focus and methodology of the study. The study’s results and an extended discussion will be summarized according to each research question. In addition, the findings will be connected to current professional literature about metacognitive reading strategies. Finally, the reader will find a discussion of the implications of this study for practitioners, and suggest future research.
V. DISCUSSION

Introduction

The study was undertaken to explore the use of metacognitive strategies by high school students, and the academic impact of these strategies on a reading comprehension task. The final chapter of the dissertation details the research focus, reviews the methodology used in this study, and summarizes the results by each research question. Finally, the reader will find a discussion of the implications of this study and for practitioners and suggest future research.

Statement of the Problem

Substantial research has contained support for the importance of metacognitive strategies to learners in today’s classrooms. However, there appeared to be a need for attention to be directed to determine which types of activities best support the development of these skills. The study was designed to compare the efficacy between verbal and a combination of written and verbal metacognitive strategies used by high school students in the reading process.

Review of the Methodology

The study utilized data gathered from 47 students at a private high school located in a large county on the southwest coast of Florida. The sample was, by definition, a convenience sample consisting of students enrolled in English II Honors (10th Grade). Study participation was also based upon specific academic pre-requisites for registration set forth by the school. The participants were divided into equivocal treatment groups for comparative purposes.
Procedurally, participants were first administered an abbreviated *American College Testing* (ACT) reading assessment followed by the *Metacognitive Awareness of Reading Strategies Inventory*, also referred to as the MARSI (Mokhtari & Reichard, 2002), a standardized assessment tool to measure metacognitive awareness.

Following the initial pre-test introductory session, all of the participants engaged in two weeks (10 meetings) of enrichment sessions at the beginning of each English II Honors class meeting. Each 10 minute enrichment session focused upon the introduction and training of metacognitive strategies. The enrichment training specifically addressed the techniques measured by the global, problem solving and support strategies in the MARSI instrument and was designed and implemented by the researcher. The enrichment sessions were presented as casual and highly interactive to encourage student participation and application.

The study consisted of two treatment groups: one treatment group received instruction in verbal metacognitive strategies only; the other treatment group received specific instruction of metacognitive strategies that included both verbal and written metacognitive strategies.

Following the intervention sessions, both treatment groups were administered a post-test consisting of a different sample ACT reading passage test. The participants were also re-administered the MARSI, and subsequent scores on both reading comprehension task and frequency of use of metacognitive strategies were compared for and between the two groups within a pre-test/post-test design.

Study data were analyzed using a variety of statistical techniques. Specifically, descriptive, inferential, and associative/predictive statistical techniques were applied to study
data to address formally stated research questions and hypotheses. The researcher examined pretest performance differences. The tasks completed by each group were also analyzed to determine academic achievement as well as the frequency of usage of MC strategies.

**Discussion by Research Questions & Hypotheses Posed**

**Research Question 1**

Considering participant use of overall reading strategies, will participants who received verbal metacognitive strategies and participants who received a combination of both verbal and written metacognitive strategies manifest increases in their frequency of use of those strategies?

**Hypothesis R1**

*Both metacognitive strategies utilized in the study will promote statistically significant increases in participant perceived use of the respective strategies.*

**Results**

Students exposed to both verbal metacognitive strategies and the combination of verbal and written strategies manifested statistically significant increases in perceived frequency of strategy use from the Pre Test to the Post Test condition of the study. In light of the statistically significant findings for both metacognitive strategies employed in the study, the Alternative Research Hypothesis ($H_a$) for Question #1 was retained.

**Interpretation and Discussion of the Findings**

The findings in Research Question 1 may be interpreted in several different ways. First, once introduced to the metacognitive techniques, participants in both groups, regardless of the nature of the implementation, increased their reported usage of the strategies during the reading
comprehension task. It appears that awareness and application may support a willingness to use these techniques by learners. All participants in the study, regardless of their group assignment, experienced this noted increase in perceived use following the direct, explicit instruction of the global, problem solving, and support strategies upon which the MARSI was structured. It is also worthwhile to recall that these sessions were comprised of only about 10 minutes per meeting, so this instruction was not overly time consuming nor cumbersome to implement.

The findings for Research Question 1 appear to validate what is evident in the professional literature concerning the power of direct instruction and instructional modeling of metacognitive strategies for learners (Paris, Wasik, & Turner, 1991; Schraw, 1998; Kramarski & Mevarech, 2003; Boulware-Goodlen, Carreker, Thornhill & Joshi, 2007). Study participants were presented with, modeled for, and allowed to practice the strategies; they were able to identify the approach, observe it in application, and then practice the strategy themselves with appropriate feedback and guidance on material designed to assess reading comprehension.

Three fundamental principles are known to exist in the professional literature that support the success of metacognitive instruction: a) presenting metacognitive instruction in the content matter to encourage connectivity, b) informing learners about the usefulness of metacognitive activities to support them prioritize the relativity of the instruction, and c) consistent training to support the maintained application of metacognitive behaviors and choices (Veenman, Van Hout-Wolters, & Affliferbach, 2006). The study structure followed the principles noted in the professional literature in the attempt to offer the best practice in metacognitive strategy instruction.
Understandably, educators have expressed concern about the amount of time necessary to teach metacognitive strategies within a classroom setting, and the impact direct instruction would have on the content delivery. In fact, the instruction of metacognitive strategies introduced in the study was not conducted in isolation, but within the confines of a reading comprehension task. Based upon the finding in Research Question 1, it would appear plausible to suggest that effective instruction of metacognitive strategies could easily take place during content delivery, and this is confirmed throughout the professional literature as well (Pellegrino & Hilton, 2012).

Research Question 2

Considering participant use of overall reading strategies, is there a difference between students who received verbal metacognitive strategies and those participants who were exposed to a combination of both verbal and written metacognitive strategies in their frequency of use of those strategies?

Hypothesis R2

Participants exposed to both verbal and written metacognitive strategies will manifest statistically significantly greater levels of frequency of strategy usage than their peers who have received only verbal metacognitive strategies.

Results

Study participants receiving the verbal metacognitive strategies demonstrated a .05 mean score difference than their peers who were exposed to the combination of both verbal and written metacognitive strategies. The mean difference of .05 between the two treatment groups was not found to be statistically significant. In light of the finding in Question #2 favoring the treatment
group exposed to only verbal metacognitive strategies, the Alternative (Hₐ) research Hypothesis was rejected.

**Interpretation and Discussion of the Findings**

Research Question 2 addresses the frequency of use of metacognitive strategies when the two groups are compared at the post test condition of the study. Although both groups manifested increases in frequency of use, the difference between the groups was minimal, suggesting that once again, what is more important is the presence of strategy instruction rather than the types of combination of strategies. Perhaps the minimal differences in reported frequency of use may be more defined through learner preference than perceived effect from a combination of sensory strategies. According to Xu (2011), a learner’s style often determines the type of strategy which is chosen to accomplish an academic task. Since the samples were not pre-screened for any learning style preferences, there may have been a higher number of students who preferred or felt a strong level of comfort with verbal strategies.

The outcome may corroborate what is known in professional literature about diminishing returns from added interventions when an initial intervention is perceived as intrinsically motivating. The unmeasured effect of being able to talk exclusively during the activity may have been initially novel, but later exerted a moderating effect.

**Research Question 3**

Considering participant respective reading comprehension achievement, will there be an increase in achievement level with participants receiving verbal metacognitive strategies and
with those participants who have received a combination of both verbal and written metacognitive strategies?

**Hypothesis R3**

*Participants receiving both metacognitive strategies will demonstrate statistically significant increases in reading achievement.*

**Results**

Participants receiving both verbal metacognitive strategies and the combination of verbal and written strategies manifested statistically significant gains in reading achievement from the Pre Test to the Post Test condition of the study. In light of the statistically significant findings for both metacognitive strategies employed in the study regarding reading achievement, the Alternative Research Hypothesis (Hₐ) for Question #3 was retained.

**Interpretation and Discussion of the Findings**

The type of metacognitive intervention strategy utilized appears not be the primary influencer in light of the statistically significant results of both strategies. But rather, it appears that the mere introduction of a metacognitive reading comprehension strategy produced and taught will increase reading comprehension achievement by participants. Moreover, considering the specific connection between reading comprehension monitoring through strategy application, the finding clearly aligns with the importance of using a metacognitive strategy during the reading process. Consistently, the professional literature contains support that the introduction of reading comprehension strategies produces an increase in student achievement (Pressley, 2000).
Furthermore, current research on the topic of metacognitive strategies promotes the notion that concurs strategies are usually not merely acquired throughout a learner’s journey, but should be taught to learners of all achievement levels (Hattie & Donoghue, 2016). Kolic-Vehovec & Bajsanski (2006) state that reading strategy instruction actually demonstrates metacognition because readers need to know the strategies and be willing to use them. In light of the findings of the current investigation, it would appear that metacognitive strategy instruction is effectual in enhancing student reading comprehension. As such, strategy instruction would appear to be beneficial in daily instruction.

**Research Question 4**

Considering participant respective reading comprehension achievement, will there be a difference in achievement level with participants receiving verbal metacognitive strategies compared to those participants who have received a combination of both verbal and written metacognitive strategies?

**Hypothesis R4**

*Considering participant reading comprehension achievement, there will be a statistically significant difference in achievement level with participants receiving verbal and written metacognitive strategies compared to those participants who have received only verbal metacognitive strategies.*

**Results**

Participants receiving the verbal metacognitive strategies only demonstrated a .46 mean score difference greater than their peers who received the combination of both verbal and written
metacognitive strategies. The mean difference of .46 between the two treatment groups was not found to be statistically significant. In light of the finding in Question #4 favoring the treatment group exposed to only verbal metacognitive strategies, the Alternative ($H_a$) research Hypothesis was rejected.

**Interpretation and Discussion of the Findings**

While not statistically significant, and in light of the finding slightly favoring verbal comprehension strategies to increase student reading comprehension achievement, one possible explanation may be considered plausible. Specifically, it is likely that students generally have been exposed to more verbal strategies throughout their educational histories. As such, students may have demonstrated a higher degree of comfort with verbal strategies given their history of use, making them more effective for use.

Moreover, the usage of dual strategies may have been perceived by students as a limiting factor in the efficiency in addressing the assignment in a timely fashion. In light of the fact that the scheduled time for the sessions was stated as approximately 10 minutes daily, students may have defaulted to the more accessible verbal strategies in order to use their time well. Most national and state level high stakes comprehension tasks are speed sensitive, so perhaps the ease of use of verbal strategies and the predominance of access would prompt verbal strategies to be the more likely choice by students if time issues were a concern.
**Research Question 5**

Considering metacognitive strategy use within the three respective Sub-Scales, which strategy will exert the greatest influence upon participant perceived frequency use of metacognitive strategies?

**Hypothesis R5**

*Considering metacognitive strategy use within the three respective Sub-Scales, the combination of verbal and written strategy will exert the greatest influence upon participant perceived frequency use of metacognitive strategies.*

**Results**

Findings for impact of metacognitive strategy upon participant perceived frequency of use within the Sub-Scales are mixed. For the “Global” Sub-Scale, verbal metacognitive strategies appear to have exerted the greatest impact upon mean increase in participant perceived frequency of use, whereas in the “Problem” and “Support” Sub-Scales the verbal and written metacognitive strategies exerted the greatest influence upon participant mean difference in perceived frequency of use. In light of the finding favoring the combination of verbal and written metacognitive strategy in two of the three Sub Scales, the Alternative (Hₐ) research Hypothesis was retained.

**Interpretation and Discussion of the Findings**

Regarding the finding favoring verbal strategies in global domain, a possible rationale for its use may lie in its relative ease of use and spontaneous quality. The use of verbally expressed strategies are quickly and effortlessly available and accessible, suggesting that these strategies,
when shared and modeled for the students, became usable approaches that facilitated the organizational approach to the reading task. Global reading strategies were described in the professional literature by Mokhtari & Reichard (2002) as those approaches used to organize and commence the reading task. Initially, verbal strategies most likely offered a strong entrance into the task of reading the passage. Additionally, with the time-sensitive aspect of the reading task, the ability to talk about the passage and associated questions offered a readily available technique that felt less cumbersome than writing in response to thoughts and questions about the passage.

In light of the finding favoring the composite strategy use of both verbal and written approaches, a possible explanation might focus upon the notion that while the global strategies were used to initially access the passage, it was the recording of the moments that became challenging or unclear to students that remained tangible for the participants. Mokhtari & Reichard (2002) described the problem solving strategies included on the MARSI as strategies used when understanding is challenged, and support strategies as those used by readers to perpetuate the ongoing reading process. The treatment group characterized by combining verbal and written strategies may appear to have relied upon the written strategies more concretely as the reading task progressed, thus suggesting that the perceived frequency of use was more apparent to participants in the verbal and writing group. In addition, recording the places in the text during the reading of the passage that created confusion or frustration may have been perceived as more helpful for those participants, and thus recorded as a tactic that was chosen with more regularity.
Extensive discussion about why learners choose certain strategies, specifically verbal strategies in comparison to written strategies, appears to be lacking. However, regarding general strategy selection, Karpicke (2009) described several different learner generated reasons to choose certain strategies to accomplish a learning task. Karpicke’s (2009) reasons include the perceived ease or difficulty of the learning task, the perceived difficulty of the task, and the number of times the task must be repeated to understand or learn. It is therefore more likely that a combination of these factors influences participants’ strategy choices.

Research Question 6

Regarding the methods of metacognitive strategy instruction, which of the three subscales represents the most robust correlate and predictor of participant reading comprehension achievement?

Hypothesis R6

At least one of the three Sub-Scales will represent a statistically significant correlate and predictor of participant reading achievement for each treatment group.

Results

The mathematical relationships for both treatment groups with the “Global” Sub-Scale and participant reading achievement are considered “weak” (r < .20). With regard to the other two Sub-Scales, the relationships are considered slightly beyond “weak” and approaching “moderate”. The relationships for the treatment group exposed to verbal metacognitive strategies only are uniformly “inverse”, whereas the relationships for the treatment group exposed to both verbal and written metacognitive strategies are “direct”. Regarding the
predictive abilities of the research instrument’s Sub-Scales, none of the three Sub-Scales represented statistically significant predictors of participant reading achievement in either treatment category. Sub-Scales represented “inverse” predictors of participant reading achievement for the treatment group exposed to only verbal metacognitive strategies, whereas the Sub-Scales for the treatment group exposed to both verbal and written strategies represented “direct” predictors of participant reading achievement. In light of the absence of statistically significant correlates and predictors amongst the study’s Sub-Scales, the Alternative (Hₐ) Research Hypothesis was rejected.

**Interpretation and Discussion of the Findings**

In predicting reading achievement, the impact of the Global subscale was considered weak/moderate and not statistically significant. Interestingly, verbal strategies alone represented an inverse relationship with and a predictive effect upon participant reading achievement, whereas, the composite of verbal and written MC strategies exerted a positive or direct relational/predictive effect upon student participation.

One possible plausible explanation for this differentiated impact upon reading achievement by strategy type may lie in the fact that the treatment group that utilized the combination of written and verbal metacognitive strategies produced written documentation of strategy implementation that supports student preference in selecting the combination of strategy for efficacy purposes. It may also be the case that as the reading task progressed, it was more challenging for students in the verbal group to recall statements made to support their comprehension in the earlier part of the passage, since there was no written documentation to
serve as a reminder of the ideas and responses as they occurred. The finding supporting student use of the combination strategy appears to explain the slight elevation of strategy use for the problem solving domain of the MARSI by the verbal group; as the students sought to resolve their lack of understanding at challenging points without a written record to refer, they were challenged by the difficulty in retracing their steps to find the desired information. Although the majority of published professional research on the matter has focused primarily upon the importance of a written record in mathematics problem solving (Garofalo & Lester, 1984; Pugalee, 2004), the implications of the written record to support verbal strategies appear to bear relevant similarity with reading comprehension literature.

Regarding reading comprehension, an interesting finding was suggested by Rivard & Straw (2000) in their study that found “talk” during an academic task is important for clarifying, hypothesizing, explaining, and formulating ideas. Although, from the study it was determined that analytical writing is an important tool for transforming basic ideas into knowledge that is more coherent and structured. According to Rivard & Straw (2000), “talk” combined with writing appears to enhance the retention of complex learning over time. These findings would appear to provide rationale for focus addressed in Research Question 6. As such, it would appear a combination of strategies focusing on both verbal and written methods would be most effectual for sustained achievement in the area of reading comprehension.

**Summary of Findings**

Verbal metacognitive strategies and a combination of both verbal and written strategies produced statistically significant results for frequency of use. Peer discussion appeared to be
critical for refining and encouraging strategic thinking. In addition, both groups produced statistically significant results for reading achievement gains following the direct instruction of each strategy emphasis.

Verbal strategies appeared to have an edge over written/verbal combination for frequency of use/reading comprehension achievement. While not statistically significant, trends were evident in the resultant data that offered possible explanations.

When considering the issue of which metacognitive strategy exerts a more productive relational/predictive effect, verbal/written strategies appear to be superior. Generally, learners tend to be more successful making meaning and refining understanding through discussion during collaborative activities. However, within a time sensitive testing scenario, a combination of written and verbal strategies are more likely to help produce better results by providing the user with a visible schema upon which to record their recollections. The written records created by the user help to confirm information contained within the text, rather than merely attempting to recall the verbal reactions that occurred at the point in the text as it was read.

Limitations

Although the results of the current investigation provided a viable evaluation of the use and benefit of metacognitive strategies experienced by learners while addressing a reading comprehension task, there were some minor limitations that may have impacted the validity of the study results. First, to fulfill the parameters of the study, the intervention phase spanned a relatively short timeframe. While the design followed recommendations noted in the professional
literature, it may be necessary to determine the efficacy of an intervention when the timeframe is extended.

Second, regarding the study’s research design and methodology, it would appear advantageous to explore the impact of the intervention over extended evaluation points. While the intervention produced definitive short term effects, it is unclear as to the duration of the impact of the intervention. A delayed post-test could be introduced to determine the longevity of the metacognition strategy intervention, and answer the question regarding if academic achievement is sustainable over an extended amount of time. Although the pre-test/post-test within subjects design appropriately addressed certain stated research questions, an extended repeated measures design (repeated measures ANOVA) would appear to better address the issue of durability of treatment affect.

The intervention itself was limited to a very specific, standardized style of reading passage offered on the ACT. There was no exploration to determine the applicability to the perceived strategy usage and reading achievement in other types of reading passages or content areas, such as science or history. The matter of generalization would appear to be unresolved from the design and findings of the current study.

**Implications for Professional Practice**

As verbal metacognitive strategy implementation tended to not only promote an increase in use by the participants following the intervention, it also supported improved performance on the reading comprehension task. By introducing the writing component with the discussion opportunity, the sustainable long-term outcome would appear promising for practitioners.
For practitioners, the study’s findings contained support for the value of direct instruction of metacognitive strategies within a content area. In light of the fact that significant academic achievement was obtained through a relatively minor amount of time (10 minutes each day for ten days), the value of strategy instruction for learners remains clear. The combination of the presentation, modeling, and application of metacognitive strategies throughout instruction was likely instrumental in helping participants become more aware of applicable ways to pursue learning tasks, as well as to create better learning outcomes. Teachers specifically, should not feel the burden of adding a separate classroom segment to instruct on metacognitive strategies, but instead develop a natural, sustainable practice of modeling metacognition strategies throughout their lessons to help develop this important skill in their students.

While verbal or discussion based strategies among participants seemed to work well to provide an initial distribution of shared understanding, the mere application of verbal strategies appears to only offer an initial, albeit valuable, benefit. Consideration would appear to be appropriate for structuring reading activities in a specific instructional sequence, with flexibility afforded for reading selections that align with both strategy and assessment. For example, an introductory passage that sets up a lesson may not be the optimal point at which to require any more than minimal writing to support understanding, while the focal text would necessitate expanded interaction through both talk and writing. For sustained strength of learning and achievement in applicable activities that require deeper reading comprehension, a combination of verbal and written strategies reflects of high degree of professional support in the literature. As
such, educational practitioners should be encouraged to facilitate both verbal and written interaction at different levels with a variety of texts throughout the learning process.

Limiting text-based activities to merely discussion during individual reading risks sacrificing the production of a tangible point of reference for students to refer back to throughout a learning activity. Students should be encouraged to experience the benefit of written strategies in support of learning as a vehicle by which to easily access thoughts that were present at the time of reading the passage which is linked to the written response. Further, the act of writing helps to refine understanding in such a way that makes meaning clearer and more specific beyond what just language can produce. The disappearing nature of verbal utterances must be acknowledged, and students should be trained to strategically record their thoughts, questions, and decisions that occur during reading to strengthen deeper learning. Overall, an understanding of the monitoring and control processes involved in metacognitive strategy selection has the ability to inform classroom practices that may help students recruit more effective learning strategies.

**Recommendations for Further Research**

Several areas of possible research have emerged from the current investigation. Specifically, the following areas related to the research topic would appear to represent viable extensions of the study: learner preferences, gender, culture and ethnic differences, strategy hierarchy, usability of strategies, cross curricular application, and a qualitative expansion to the methodology and design.
Learner Preferences

The treatment groups represented in the study were not screened for possible preferences regarding learning styles or learning preferences, as such, learner preference did not represent an essential independent variable in the study. Within recent years, the profession of teaching has acknowledged the importance of understanding learning styles and preferences among students. Merrill (2000) suggested that instructional strategies should first be determined on the basis of the type of content to be taught, subsequently allowing learner styles and preferences are then used to adjust or fine-tune these fundamental learning strategies. Merrill (2000) continued by noting that many students are unaware of their learning styles and unlikely to learn or explore new ways unless presented with additional information about themselves as learners. The benefits associated with metacognitive strategies can be realized by encouraging learners to better understand about their own learning and that of others (Coffield, et. al., 2004). The connection between learning preferences and metacognitive strategy training and implementation certainly merits further study.

Gender, Cultural & Ethnic Differences

Gender was not an independent variable represented in the study for its impact upon the use or implementation of strategies. However, future research endeavors would appear viable in evaluating any influences gender of participants may exert upon the topic in question. According to Rivard (1994), participant features such as ethnicity and gender may affect the use of strategies. Future research studies may seek to include a more diverse sample of participants in an effort to better generalize study results.
Mixed Ability Learners

The professional literature is rife with support for the notion of the role and importance of struggling learners to be taught comprehension strategies (Mokhtari & Reichard, 2002). Unskilled readers often do not know about strategies to support their learning, or do not know when to use them (Paris & Winograd, 1990). Future research endeavors focusing on struggling readers and learners appear to be warranted in an effort to determine if certain types of strategies would benefit struggling learners more than others as they refine and develop an awareness of metacognitive approaches in general. Further study on the matter could also center on the efficacy of strategy choice relevant to learner ability. Additionally, an evaluation of strategy matching with unskilled learners in need of repertoire expansion appears to be warranted.

Strategy Hierarchy

In light of the study’s findings, verbal strategies appear to provide an initial foundation for understanding, while written strategies subsequently may refine thinking and understanding. The issue of strategy hierarchy comes into play as a possibility of enhancing application efficacy for matching process. As such, an area of interest related to strategy hierarchy would appear to lie in evaluation of hierarchical application of strategy and subsequent efficacy of performance.

Ways to Make Strategy Use More Time Friendly

In light of the findings particularly focused upon the time limitation associated with written and verbal strategy use, it would appear plausible that future studies would endeavor to evaluate possible efficient means of teaching strategy use. Additionally, the potential for easing
the time-conscious element of written strategies would appear in need of streamlining and refining for efficacy purposes.

**Across Content Areas**

The study’s intervention itself was limited to a very specific, standardized style of reading passage offered on the ACT. Future research would appear to benefit from an exploration of perceived strategy usage and reading achievement in other types of reading tasks across the curriculum, such as science or history. Of primary interest would be matching strategies with different content areas. A successful matching of specific strategies to unique demands of academic content areas would appear to greatly benefit raising student achievement levels in content areas beyond the scope of this current reading comprehension study.

**Qualitative Expansion**

Qualitative research has the advantage of providing deeper, richer, and thicker descriptions of phenomena of interest. As such, it would appear beneficial to conduct either a qualitatively oriented study on the topic, or even a mixed methods approach that would provide substantial quantitative data along with the richer information derived from qualitative work.

**Conclusion**

The iconic Greek philosopher, Plato, described thinking as “the mind talking to itself.” If so, learning could be described as a complex conversation that occurs within the mind, but yet also involves the exterior source of information that is to be studied. This conversation becomes an elaborate internal process, not only about the knowledge, but how the learner is reacting to the
information, and adjusting their cognitive management strategies accordingly. Metacognition is this very process.

Unfortunately, many learners are unable to articulate how they “think” about their “thinking.” By identifying and becoming aware of these thought processes, students may be able to better control and even leverage these strategies for maximum learning performance. In the area of literacy, the externalization of thinking strategies can clearly benefit readers as they work to navigate unfamiliar texts in various forms. Metacognitive strategies that support reading comprehension are a key supporter for the conversation in learners’ minds. Strategies may take shape as verbal utterances that describe thinking, or written expression of the thinking process. Either way, metacognitive strategies are important and effective tools for students to acquire.

The study topic emerged from the personal interest of the researcher about the benefits for students to learn to think strategically and gain control over their thinking processes to maximize learning. These strategies are teachable, sustainable, and highly beneficial for students. As students develop a working repertoire of verbal and written strategies, their ability to handle challenging texts and concepts across the curriculum increases exponentially. As reading serves as a wide conduit to the delivery of information, it must offer meaningful opportunities for learners to make sense of the text for learners who are working to regulate and choose the most valuable concepts to retain. The more power a learner has over how they think and what they know, the more likely they will be able to build a deeper understanding of new information in rich and meaningful ways. It is these thinking skills that will position students to be able to
converse in the highly intricate, frequently perplexing, and intriguingly fluid world in which they live.
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APPENDICES

Appendix A: Metacognition Study Parental Informed Consent

Parental Permission to participate in Social & Behavioral Research

Information for parents to consider before allowing your child to take part in this research study.

IRB Study # _______________

The following information is being presented to help you and your child decide whether or not your child wishes to be a part of a research study. Please read this information carefully. If you have any questions or if you do not understand the information, we encourage you to ask the researcher.

We are asking you to allow your child to participate in a research study involving learning strategies used in the reading process called:

A Comparison of Metacognitive Strategies Used by High School Students in an ELA Classroom

The person who is in charge of this research study is Jennifer Gannaio. This person is called the Investigator. However, other research staff may be involved and may act on behalf of the person in charge. Dr. Susan Stanley, Southeastern University, and Dr. Nina Graham, Calvary Christian High School are guiding Jennifer in this research.

The research will be conducted at Calvary Christian High School.

Why is this research being done?

Metacognition (MC) is the act of being aware of the thinking strategies that are being used during one’s learning process. Metacognitive strategies have been identified and used in classrooms to help learners plan, monitor and evaluate their learning. The study will involve direct instruction of thinking strategies used in the reading process, and a comparison of student performance before and after the instruction.

Why is your child being asked to take part?
We are asking your child to take part in this research because he/she is an honors student in an ELA classroom. We would like to find out more about what learning strategies are most effective for use in academic reading tasks.

**Should your child take part in this study?**

This informed consent form tells you about this research study. You can decide if you want your child to take part in it. This form explains:

- Why this study is being done.
- What will happen during this study and what your child will need to do.
- Whether there is any potential benefit your child might experience from participating in the study.
- Whether there is any potential risk from participating in the study.

Before you decide:

- Read this form.
- Have a friend or family member read it.
- Talk about this study with the person in charge of the study or the person explaining the study. You may have someone with you when you talk about the study.
- Talk it over with someone you trust.
- Find out what the study is about.
- You may have questions this form does not answer. You do not have to guess about things you don’t understand. If you have questions, ask the person in charge of the study or study staff as you go along. Ask them to explain things in a way you can understand.
- Take your time to think about it.

The decision to provide permission to allow your child to participate in the research study is up to you. If you choose to let your child be in the study, then you should sign this form. If you do not want your child to take part in this study, you should not sign this form.

**What will happen during this study?**

The study will last about four months, but your child will be involved over the course of approximately 2 ½ weeks during their regularly scheduled class period of English 2 Honors. Classroom lessons will continue as usual, but there will be a 10 minute enrichment session during each class meeting that will focus on the instruction of learning strategies. Before the start of these enrichment sessions, your child will complete a brief survey that asks them to rate the frequency of use of various thinking strategies that
apply when reading academic text. Your child will also complete a sample ACT reading passage. They will also complete this survey and the ACT reading passage again following the enrichment sessions.

School administrators/faculty have agreed not to access the material related to the research. All data will be kept in a locked filing cabinet for a minimum of five years after the final report has been submitted to the Southeastern University IRB. After a minimum of five years, paper records will be destroyed using a paper shredder, and digital files will be completely deleted from any digital recorders and computers.

**How many other people will take part?**

Approximately 40 students will take part in the study, and the research is taking place at Calvary Christian High School because that is where Jennifer Gannaio is employed.

**What other choices do you have if you decide not to let your child take part?**

If you decide not to let your child take part in this study, that is okay. They will not participate in the enrichment sessions, but will remain in the room during the instruction.

**Will your child be compensated for taking part in this study?**

You will receive no payment or compensation for taking part in this study. No portion of this study will negatively or positively affect your child’s grades whatsoever.

**What will it cost you to let your child take part in this study?**

It will not cost anything to let your child take part in the study.

**What are the potential benefits to your child if you let him/her take part in this study?**

We do not know if your child will gain any benefits by participating in this study. It is believed that your child’s involvement in the study will contribute to a better understanding of effective learning strategies.

**What are the risks if your child takes part in this study?**

This research is considered to hold minimal risk. That means that the risks associated with this study are the same as what you face every day. Given the minimal risk of involvement in this study, there are no other safety precautions in place beyond those that would be in place during any regular class session (“every day” type safety precautions).

**Privacy and Confidentiality**

We will keep your child’s study records private and confidential. Performance data will remain anonymous. Certain people involved with the study may need to see the data generated from the research.
By law, anyone who looks at these records must keep them completely confidential. The only people allowed to see these records are:

- The research team, including the Principal Investigator and Co-Investigators.
- Certain government and university people who need to know more about the study. For example, individuals who provide oversight on this study may need to look at the data generated from the study. This is done to make sure that we are doing the study in the right way. They also need to make sure we are protecting your rights and safety.
- Any agency of the federal, state, or local government that regulates this research.
- The Southeastern University (SEU) Institutional Review Board (IRB) and its related staff who have oversight responsibilities for this study, staff in the SEU College of Education, and other SEU offices who oversee such research.

We may publish what we learn from this study. If we do, we will not include your child’s name. We will not publish anything that would let people know who your child is.

What happens if you decide not to let your child take part in this study?

You should only let your child take part in the study if you both are willing. You and your child should not feel that there is any pressure to take part in the study to please the researcher or staff.

If you decide not to let your child take part:

- Your child will not be in trouble or lose any rights he/she would normally have.
- Your child will still get the same services he/she would normally have.

You may decide after signing this informed consent form that you no longer want your child to take part in this study. However, you can decide you want your child to stop taking part in the study for any reason at any time. If you decide you want your child to stop taking part in the study, tell the study staff as soon as you can.

Even if you want your child to stay in the study, there may be reasons we need to withdraw them from the study. Your child may be taken out of this study if we find out it is not safe for your child to stay in the study or if your child is not in attendance for the sessions when scheduled. We will let you know the reason for withdrawing your child’s participation in this study.

You can get the answers to your questions, concerns, or complaints.

If you have any questions, concerns, or complaints about this study, call Jennifer Gannaio at 727-735-5076.
If you have questions about your child’s rights, general questions, complaints, or issues as a person taking part in this study, you may call the SEU IRB at 863-667-5097 or Dr. Nina Graham, Director of Instructional Effectiveness for the site, Calvary Christian High School at 727-449-2247.

Consent for My Child to Participate in this Research Study

It is up to you to decide whether you want your child to take part in this study. If you want to take part, please read the statements below and sign the form if the statements are true.

I freely give my consent to let my child take part in this study as described above. I understand that by signing this form I am agreeing to let my child take part in research. I understand that I may print a copy of this form.

________________________________________________
Signature of Parent/Guardian of Child Taking Part in Study           Date

_______________________________________________
Printed Name of Child Taking Part in Study

The signature of only one parent was obtained because (Check one):

- The other parent is not reasonably available. Explain. ________________________________
- The other parent is unknown.
- The other parent is legally incompetent.
- The parent who signed has sole legal responsibility for the care and custody of the child.

Statement of Person Obtaining Informed Consent

The above form explains to the parent of the child taking part in the study what he or she can expect from his/her child’s participation. It is my intention that when this person signs this form, to the best of my knowledge, he/she understands:

- What the study is about;
- What procedures will be used;
- What the potential benefits might be; and
- What the known risks might be.

________________________________________________
Signature of Person Obtaining Informed Consent           Date

Jennifer E. Gannaio, Person Obtaining Informed Consent
Appendix B: Metacognitive Awareness of Reading Strategies Inventory (MARSI)

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.

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

MARSI Questions Aligned with Subscales

<table>
<thead>
<tr>
<th>Aim</th>
<th>Global Reading Strategies (GLOB Subscale)</th>
<th>Problem Solving Strategies (PROB Subscale)</th>
<th>Support Reading Strategies (SUP Subscale)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Generalized, intentional reading strategies aimed at setting the stage for the reading act.</td>
<td>Provide readers with action plans that allow them to navigate text skilfully and are localized, focus problem solving or repair strategies used when problems develop in understanding textual information.</td>
<td>Provide the support mechanisms aimed at practical responses to the sustaining of reading,</td>
</tr>
</tbody>
</table>

Ex. Setting purpose for reading, activating prior knowledge, checking if text content fits purpose, predicting what text is about, confirming predictions, previewing text for content, skimming to note text characteristics, making decisions in relation to what to read closely, using context clues, using text structure and other features to enhance reading comprehension.

Ex. Reading slowly and carefully, adjusting reading rate, paying attention when reading, pausing to reflect on reading, rereading, visualizing information, reading text aloud, guessing unknown words.

Ex. Taking notes while reading, paraphrasing, revisiting previously read information, asking self-questions, using reference materials as aids, underlining text information, discussing reading with others, writing summaries of reading.

|   | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 |
|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
|   | I have a purpose in mind when I read. | I read slowly but carefully to be sure I understand what I am reading. | I take notes while reading to help me understand what I read. | I think about what I know to help me understand what I read. | I try to get back on track when I lose concentration. | When text becomes difficult, I read aloud to help me understand what I read. | I adjust my reading speed according to what I’m reading. | I summarize when I read to reflect on important information in the text. | I discuss what I read with others to check my understanding. | I underline or circle information in the text to help me remember it. | I try to picture or visualize information to help remember what I read. | I use reference materials such as dictionaries to help me understand what I read. | I try to guess the meaning of unknown words or phrases. | I go back and forth in the text to find relationships among ideas in it. | I use typographical aids like bold face and italics to identify key information. | I critically analyze and evaluate the information presented in the text. | I check my understanding when I come across conflicting information. | I try to guess what the material is about when I read. | I check to see if my guesses about the text are right or wrong. |
# Appendix D: Intervention Enrichment Session Overview

## Enrichment Session Overview

<table>
<thead>
<tr>
<th>Session</th>
<th>Summary of Strategy Presented in Session</th>
<th>Enrichment Session Daily Plan</th>
</tr>
</thead>
</table>
| Pretest | none | Students will complete:  
  - ACT Reading Comprehension Passage with 10 multiple choice questions  
  - Metacognitive Awareness of Reading Strategies Inventory |

### 1

**Global Subscale Strategies**
- Set a purpose-1  
- Consider any previous knowledge-3  
- Preview the text to see what it’s about-4  
- Determine reading purpose (including comprehension questions)-7

**Problem Solving Subscale Strategies**
- Guess the meaning of unknown words or phrases-30

**Support Reading Subscale Strategies**
- Take notes to help me understand-2

Introduction: The teacher will share that the purpose of this enrichment session is to explore ways to help build students’ reading comprehension.
- Written and Verbal Treatment Group to receive instruction pertaining to strategies to be applied through both writing and talking.
- Verbal Treatment Group to receive instruction pertaining to strategies to be applied through verbal means only.
- Identified strategies will be presented and modeled, students and teacher will practice them together, and then participants will apply the strategies to a sample ACT reading passage themselves.
- The strategies will be presented as questions a reader should ask themselves as they begin, progress, and encounter challenges in a text.
- All students will receive a copy of the reading passage on paper; students should put their name/class period on the packet to use throughout the treatment.

Session Focus: Strategy Based Questions
- What is my purpose? (Aligns with Global Subscale Question 1: Set a purpose)
- What do I know about this topic? (Aligns with Global Subscale Question 3: Consider any previous knowledge)
- What does this seem to be about? (Aligns with Global Subscale Question 4: Preview the text to see what it’s about)
- Will this text help me achieve my purpose for reading? (Aligns with Global Subscale Question 7: Determine reading purpose)
- What’s my plan for unknown words? (Aligns with Problem Solving Subscale Question 30: Guess the meaning of unknown words or phrases)
- How can I keep track of what information I read? (Aligns with Support Subscale Question 2: Take notes to understand.)

Collect passages, end session

<table>
<thead>
<tr>
<th>2</th>
<th>Global Subscale Strategies</th>
<th>Introduction: Distribute reading passages back to students. Confirm that each student has his/her own copy. Review prior session focus</th>
</tr>
</thead>
</table>
|   | Skim test and note characteristics-10  
- Decide what to read closely/what to ignore-14  
- Use tables/figures to increase understanding-17 | Session Focus: Strategy Based Questions
- What can I note through a quick skim of the text? (Align with Global Subscale Question # 10)
- What should I read closely or ignore? (Align with Global Subscale Question #14)
- Do I see any tables or figures? (Align with Global Subscale Question #17) |

Collect passages, end session
| Use context clues to help increase my understanding-19 | • When I get confused, how do I figure things out? (Align with Global Subscale Question 19)  
• What should my reading pace be? (Align with Problem Solving Subscale Question #8)  
• What should I do in a challenging part of the text? (Align with Problem Subscale Question #16)  
• When might I want to read aloud? (Align with Support Subscale Question #5)  
• How can I note information that seems important? (Align with Support Subscale Question #12) |
| Problem Solving Subscale Strategies | Collect passages, end session |
| Read slowly but carefully for understanding-8 |  
Pay attention as text becomes difficult-16 |
| Support Reading Subscale Strategies |  
Read aloud when text becomes difficult-5  
Underline or circle information for recall-12 |
|  
• When I get confused, how do I figure things out? (Align with Global Subscale Question 19)  
• What should my reading pace be? (Align with Problem Solving Subscale Question #8)  
• What should I do in a challenging part of the text? (Align with Problem Subscale Question #16)  
• When might I want to read aloud? (Align with Support Subscale Question #5)  
• How can I note information that seems important? (Align with Support Subscale Question #12) |
| Collect passages, end session |
|  
Introduction: Distribute reading passages back to students. Confirm that each student has his/her own copy.  
Review prior session focus. |
| Session Focus: Strategy Based Questions |
| • Do I see any bold print or italics? (Align with Global Subscale Question #22)  
• How do I break apart information I’m reading? (Align with Global Subscale Question #23a)  
• What do I do when I get off track or lose my concentration? (Align with Problem Solving Subscale Question #11)  
• When should I re-read parts of the text? (Align with Problem Solving Subscale Question #27)  
• Where can I get outside help when I don’t “get” something? (Align with Support Subscale Question #15) |
| Collect passages, end session. |

| 3 | Global Subscale Strategies |
| Use boldface and italics to identify key information-22 |
| Analyze (break apart) information presented in text-23a |
| Problem Solving Subscale Strategies |
| Try to get back on track when concentration is lost-11  
Re-read when text becomes difficult to help with understanding-27 |
| Support Reading Subscale Strategies |
| Use reference materials such as dictionaries to help understanding-15 |

| 4 | Global Subscale Strategies |
| Evaluate (assign a value) to information presented in text-23b |
| Problem Solving Subscale Strategies |
| Adjust reading speed based on what is being read-13. |

Introduction: Distribute reading passages back to students. Confirm that each student has his/her own copy.  
Review prior session focus.  

Session Focus: Strategy Based Questions  
• How do I decide what is most important to understand/remember in this passage? (Align with Global Subscale Question #23a)  
• Adjust reading speed as needed (Align with Problem Solving Subscale Question #13)
Stop from time to time and think about what is being read—18
**Support Reading Subscale Strategies**
- Paraphrase to reflect on important information—20
- Ask questions and prepare for answers—28

<table>
<thead>
<tr>
<th>5.</th>
<th><strong>Global Subscale Strategies</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Check understanding when faced with conflicting information—25</td>
</tr>
<tr>
<td></td>
<td>Make a guess about what the material is about—26</td>
</tr>
<tr>
<td></td>
<td>Confirm guesses (predictions)—29</td>
</tr>
<tr>
<td></td>
<td><strong>Problem Solving Subscale Strategies</strong></td>
</tr>
<tr>
<td></td>
<td>Visualize text details/make mental pictures—21</td>
</tr>
<tr>
<td></td>
<td><strong>Support Reading Subscale Strategies</strong></td>
</tr>
<tr>
<td></td>
<td>Discuss with others what is understood about the reading—9</td>
</tr>
<tr>
<td></td>
<td>Summarize to reflect on important information—6</td>
</tr>
<tr>
<td></td>
<td>Go back and forth to find relationships in text—24</td>
</tr>
</tbody>
</table>

Introduction: Distribute reading passages back to students. Confirm that each student has his/her own copy.

Review prior session focus

**Session Focus: Strategy Based Questions**
- What if I’m confused about what the text says? (Align with Global Subscale Question #25)
- Can I make a good guess about what may happen? (Align with Global Subscale Question #26)
- Can I confirm my guess? (Align with Global Subscale #29)
- Can I picture what I am reading about? (Align with Problem Solving Subscale Question #21)
- What does someone else think about the reading? (Align with Global Subscale Question #9)
- What is a summary of the passage? (Align with Support Subscale Question #6)
- Do I see any connections within the reading? (Align with Support Subscale Question #24)

Students will finish reading the ACT sample task and complete questions 1-10 following the passage. Collect passages. Scoring by students and debrief of passages will occur at the beginning of the next session.

---

**Week 2: Session 1**

All strategies will be open for discussion

Students will receive their sample passage to grade and review.

Recap: The teacher will share that the purpose of this enrichment session is to explore ways to help build students’ reading comprehension through the use of certain written and verbal strategies.

**Session Focus:**
- The teacher will review the reading passage, identify and discuss the correct answers with students; students will self-grade/ debrief each question, and students will share what strategies they used in support of their answer.
- Students in the treatment group receiving the written and verbal strategy instruction will be asked to read aloud the actual writing that they created in response to the strategies that were used as well as recap their own through processes.
- Students in the treatment group receiving only verbal strategies will discuss how they implemented strategies for each question.
Teacher will explain that students will receive a new passage tomorrow during the enrichment session and continue practicing the strategies presented in the sessions.

End session.

### 2

<table>
<thead>
<tr>
<th>Global Subscale Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set a purpose-1</td>
</tr>
<tr>
<td>Consider any Pre-knowledge-3</td>
</tr>
<tr>
<td>Preview the text to see what it’s about-4</td>
</tr>
<tr>
<td>Determine reading purpose (including comprehension questions)-7</td>
</tr>
<tr>
<td>Use boldface and italics to identify key information-22</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Problem Solving Subscale Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guess the meaning of unknown words or phrases-30</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Support Reading Subscale Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take notes to help me understand-2</td>
</tr>
<tr>
<td>Underline or circle information in the text to help me remember it-12</td>
</tr>
</tbody>
</table>

**Introduction:** The teacher will review that the purpose of this enrichment session is to explore ways to help build students' reading comprehension. The second portion of the enrichment will focus on the strategies introduced in sessions 1-5.

- Verbal and Written Treatment Group to receive instruction pertaining to strategies to be applied through both writing and talking.
- Verbal Treatment Group to receive instruction pertaining to strategies to be applied through verbal means only.
- Identified strategies will be presented and modeled, students and teacher will practice them together, and then participants will apply the strategies to a sample ACT reading passage themselves.
- The strategies will be presented as questions a reader should ask themselves as they begin, progress, and encounter challenges in a text.
- All students will receive a copy of the reading passage on paper; students should put their name/class period on the packet to use throughout the treatment.

**Distribute new practice reading passage to students. Passages will be collected at the end of each session.**

**Session Focus:** Students will be asked to quickly read through the passage once. Following the initial reading, teacher will conduct whole group discussion and consideration of strategies in action. Teacher will present the main focus of each session and invite students to share where in the passage and how they would apply the strategies.

- What is my purpose? (Aligns with Global Subscale Question 1: Set a purpose)
- What do I know about this topic? (Aligns with Global Subscale Question 3: Consider any previous knowledge)
- What does this seem to be about? (Aligns with Global Subscale Question 4: Preview the text to see what it’s about)
- Will this text help me achieve my purpose for reading? (Aligns with Global Subscale Question 7: Determine reading purpose)
- Do I notice any bold or italics (Aligns with Global Subscale Question 22)
- What’s my plan for unknown words? (Aligns with Problem Solving Subscale Question 30: Guess the meaning of unknown words or phrases)
- How can I keep track of what information I read? (Aligns with Support Subscale Question 2: Take notes to understand, Underline or circle information in the text to help me understand it-12)

**Collect passages, end session**

### 3

<table>
<thead>
<tr>
<th>Global Subscale Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skim test and note characteristics-10</td>
</tr>
<tr>
<td>Decide what to read closely/what to ignore-14</td>
</tr>
<tr>
<td>Use tables/figures to increase understanding-17</td>
</tr>
</tbody>
</table>

**Introduction:** Distribute reading passages back to students. Confirm that each student has his/her own copy.

**Review prior session focus**

**Session Focus:** Strategy Based Questions

- What can I note through a quick skim of the text? (Align with Global Subscale Question #10)
- What should I read closely or ignore? (Align with Global Subscale Question #14)
- Do I see any tables or figures? (Align with Global Subscale Question #17)

Collect passages, end session
|   | Use context clues to help increase my understanding-19 **Problem Solving Subscale Strategies** Read slowly but carefully for understanding-8 Pay attention as text becomes difficult-16 **Support Reading Subscale Strategies** Read aloud when text becomes difficult-5 Underline or circle information for recall-12 | • When I get confused, how do I figure things out? (Align with Global Subscale Question 19)  
• What should my reading pace be? (Align with Problem Solving Subscale Question #8)  
• What should I do in a challenging part of the text? (Align with Problem Subscale Question #16)  
• When might I want to read aloud? (Align with Support Subscale Question #5)  
• How can I note information that seems important? (Align with Support Subscale Question #12)  

Collect passages, end session   |
|---|---|---|
| 3 | **Global Subscale Strategies** Analyze (break apart) information presented in text-23a **Problem Solving Subscale Strategies** Try to get back on track when concentration is lost-11 Visualize text details/make mental pictures-21 Re-read when text becomes difficult to help with understanding-27 **Support Reading Subscale Strategies** Use reference materials such as dictionaries to help understanding-15 | Introduction: Distribute reading passages back to students. Confirm that each student has his/her own copy.  
Review prior session focus  

Session Focus:  
• How do I analyze (explain analyze=break down into smaller pieces) information in text? (Align with Global Subscale Question 23)  
• What do I do when I get off track or lose my concentration? (Align with Problem Solving Subscale Question 11)  
• How can rereading help understanding? (Align with Problem Solving Subscale Question 27)  
• If permitted, how can I access outside assistance for something I am struggling with in my reading? (Align with Support Subscale Question 15)  
• Am I visualizing? (Align with Problem Solving Subscale Question 21)  

Collect passages, close session. To be continued tomorrow.   |
| 4 | **Global Subscale Strategies** Evaluate (assign a value) to information presented in text-23b **Problem Solving Subscale Strategies** Stop from time to time and think about what is being read-18 **Support Reading Subscale Strategies**  
. | Introduction: Distribute reading passages back to students. Confirm that each student has his/her own copy.  
Review prior session focus.  

Session Focus:  
• What is most important to understand/remember in this passage? (Align with Global Subscale Question 23b)  
• How can pausing during reading help? (Align with Problem Solving Subscale Question 18)  
• How can paraphrasing help me understand? (Align with Support Subscale Question 20)  
• What questions can I ask and answer- or not answer- yet? (Align with Support Subscale Question 28)  

Collect passages, close session   |
| 5 | **Global Subscale Strategies**  
Check understanding when faced with conflicting information-25  
Make a guess about the material is about-26  
Confirm guesses (predictions)-29  
**Problem Solving Subscale Strategies**  
Adjust reading speed based on what is being read-13  
**Support Reading Subscale Strategies**  
Discuss with others what is understood about the reading-9  
Summarize to reflect on important information-6  
Go back and forth to find relationships in text-24 |
|---|---|
| **Introduction:** Distribute reading passages back to students. Confirm that each student has his/her own copy.  
**Session Focus:** As students prepare to finish reading the passage, think about the following strategies as well as the one’s presented to date:  
- Wait, what if I’m confused about what the text says? (Align with Global Subscale Question 25)  
- What could I guess about the material? (Align with Global Subscale Question 26)  
- Can I confirm my guesses were correct? (Align with Global Subscale Question 29)  
- When should I change the rate of my reading speed? (Align with Problem Solving Subscale Question 13)  
- What does my classmate understand about the text? (Aligns with Support Subscale Question 9)  
- Can I find any relationships in the text? (Align with Support Subscale Question 24)  
- How would I summarize this reading (Align with Support Subscale Question 6)  
Students will finish reading and questions 1-10 at the end of the passage. Self-score of passages by students.  
**Debrief:** Teacher will ask students how they did, what strategies did they notice working for them?  
**Collect passages. Post-test during next session.** |