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Writing is an essential skill for optimal success in school and in the workforce. While academic ability and skill are critical for successful writing outcomes, alone such factors are insufficient for optimal outcomes. How students view themselves and their abilities is critical to academic success and to persisting in the face of frustration and failure. Students with low levels of writing self-efficacy, high levels of writing apprehension, and who fail to use self-regulatory strategies are less likely to be skilled writers or pursue opportunities perceived to demand larger amounts of writing. Conversely, students with higher levels of writing self-efficacy, lower levels of writing apprehension, and who use self-regulatory strategies are more likely to be successful writers in high school and beyond. This embedded mixed methods research study investigated and analyzed the effects of a Self-Regulated Strategy Development (SRSD) based writing intervention on levels of writing self-efficacy, writing apprehension, strategy-use, and writing performance of high school students in two science classes. Grounded in Bandura's social cognitive theory, the study enhances quantitative data by incorporating qualitative data, notably a microanalysis component, the results showed that the intervention improved students' feelings about their abilities to write, ameliorated writing apprehension, increased their use of self-regulatory strategies, and boosted writing performance. Future research suggestions are presented and implications for educational practice are discussed.

THE EFFECTS OF AN SRSD-BASED WRITING INTERVENTION ON THE SELF-EFFICACY, WRITING APPREHENSION, AND WRITING PERFORMANCE OF HIGH SCHOOL STUDENTS: A MIXED METHODS STUDY

by

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Dale Schunk
Committee Chair

I dedicate this dissertation in loving memory of my husband, Keith Smith (November 19, 1958 – August 24, 2015), without whose constant support, dedication, and encouragement, none of this would have been possible.

“i carry your heart (i carry it in my heart)”

- E.E. Cummings

APPROVAL PAGE

This dissertation, written by Anne Katherine Griswold, has been approved by the following committee of the Faculty of The Graduate School at The University of North Carolina at Greensboro.

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TABLE OF CONTENTS

Page

LIST OF TABLES

Page

LIST OF FIGURES

Page

CHAPTER I

INTRODUCTION

Background

The U.S. is facing a mounting crisis in education. In addition to lagging in educational performance according to the Program in International Student Assessment (PISA), which ranks the U.S. behind twenty-plus countries including Estonia, the Czech Republic and Slovenia, approximately 30% of American high school students drop out before attaining a high school diploma (Darling-Hammond, 2010). If the U.S. is to recover from this crisis, policy makers, administrators, teachers, and academic researchers must look for novel approaches to address this situation, both for current students and future generations who must compete in an increasingly global economy. Written communication is more important than ever in a world where verbal communication has been relegated to second-class status, replaced by social media and the convenience of e-mail. In order to maximize the chances of being successful in high school and beyond, writing is a skill that merits attention.

Statement of the Problem

According to results from National Assessment of Educational Progress (NAEP) writing assessment, 2011, approximately one-quarter of the 52,200 eighth- and 12th-grade students who took the assessment reached or exceeded proficiency, 3% performed at or above the advanced level, and approximately 80% performed at or above the basic

level. What this means is that 80% of the students who took the NAEP assessment showed only an achievement level of basic, which denotes "partial mastery of prerequisite knowledge and skills that are fundamental for proficient work at each grade" (National Center for Education Statistics [NCES], 2012, p. 7). If these results are indicative of the writing ability of students in American schools, they indicate a need for research and action. Furthermore, it has been found that little to no writing occurs in high school content area classes (Applebee & Langer, 2013).

Considering the poor writing performance of American students as indicated by national test results and the lack of writing and writing instruction occurring in content area classrooms, such as science (Applebee et al., 2013), it is imperative to find methods of writing instruction that may be employed in a variety of science classrooms by educators with diverse backgrounds. Self-regulated strategy development (SRSD) has been tested extensively with low-performing and learning disabled students (Graham & Harris, 1996; Harris, Graham, Mason, & Friedlander, 2008), and this has shown promising results. Self-efficacy (Bandura, 1997) and self-regulation (Zimmerman & Bandura 1994) have also been found to be influential constructs for writing performance. Writing apprehension or anxiety was found to play a role in the writing competencies of students (Bandura, 1997; Daly, 1978) and Locke and Latham's (1990) goal theory has been applied successfully to writing interventions (Pintrich & de Groot, 1990; Schunk; 1990, 2003). Finally, strategy-use has been associated with positive writing outcomes (Graham & Perin, 2007a; Mason, 2013). Applebee et al. (2013) found students are assigned little, if any longer, more complex writing assignments. A writing intervention

that has the potential to be implemented in various science classrooms and encompasses the multiple, complex variables involved in the writing process is required.

Purpose of the Study

The purpose of this study was to test the impact of a writing intervention which was based on the SRSD work of Graham and Harris (1996). Initially designed in 1982 to address the needs of students with learning disabilities, in recent years, SRSD has proven to be a successful approach with multiple students who struggle with writing (Harris et al., 2008). This study was designed to improve high school students' self-efficacy for writing research papers in the science setting, reduce anxiety related to such writing, increase the use of self-regulatory strategies, and as such improve the quality of research papers on science topics. The intervention provided the tools necessary for planning, organizing, and executing the complex writing assignments students are charged with in high school and in the post-secondary setting. While SRSD interventions were not designed to replace a broader writing curriculum, it was hypothesized that the intervention would provide a quality addition to any science curriculum comprising a research paper requirement. It was hypothesized that through the utilization of strategies taught during a SRSD-based writing intervention developed to teach students how to write research papers on science-related topics, students would show an increase in self-efficacy for writing, a decrease in anxiety related to writing, an increase in strategy use, and ultimately higher quality research papers. In summary, since it was found that "individual differences in motivation predict writing" (Graham, 2006, p. 467), it was

hypothesized that by focusing on certain affective aspects involved with writing versus simply the process or product, student writing performance would improve.

Significance of the Study

The study is vital and significant, as it provides a valuable intervention for educators who wish to teach writing effectively in the science classroom setting, thus it makes a valuable contribution to the field. Furthermore, given that writing is a complex process that most American students fail to master, such interventions are necessary to help address the nation's writing dilemma. Children and adolescents, as well as many adults, lack even the most basic writing skills; skills that are necessary, not just for success in school, but often in the workforce (Graham & Perin, 2007b).

Research on cognitive strategy instruction has been conducted across multiple academic domains. Such studies have centered on the connection between cognitive skills and affective constructs, such as motivation. For example, noted cognitive researchers such as Pajares (2006) and Pajares, Johnson, and Usher (2007) have highlighted the connection between students' cognitive skills and the ways in which they feel about their abilities to perform in certain domains. It can thus be inferred that the self-beliefs students bring to the table regarding their writing abilities play a pivotal role in their writing outcomes.

For the most part, research on writing which includes an affective component has been quantitative in nature. The lack of alternative perspectives in the motivation field creates a gap in the literature. Furthermore, according to Pajares and Johnson, 1996, there is no research on the causality of self-efficacy beliefs in writing or addressing how

students' beliefs about their capabilities in writing evolve. Pajares and Johnson (1996) specifically stated that qualitative studies should be undertaken to examine how student writing beliefs are developed and to study what connections students make between these beliefs and their writing outcomes, and ultimately the academic paths they pursue. Finally, there is a lack of literature that explores why students do what they do during the writing process at the fine-grained level. Qualitative studies that focus on rich rigor, or "complexity and abundance" (S. J. Tracy, 2010, p. 841) offer the opportunity to examine what is going on from a more in-depth and personal perspective. No mixed methods studies could be located, thus this study aims to bridge the gap between the traditional quantitative studies on constructs such as self-efficacy and writing and the call for qualitative studies on the topic.

In addition to the general lack of methodologically diverse studies examining writing from a motivational perspective, most studies have examined students at the elementary (Pajares & Valiante, 1997; Schunk & Swartz, 1993a; 1993b) and college (Pajares & Johnson, 1994; White & Bruning, 2005) levels. Fewer studies have examined the affective impact of writing on high school students, signifying a further gap in the literature. Given that high school is a time when adolescents make important decisions and self-efficacy has been shown to impact such decisions (Bandura, 1977, 1986, 1997; Pajares, 1996; Schunk & Meece, 2006), it seems appropriate that a study examining high school students' self-beliefs on writing be conducted. No studies could be located that examined the research paper genre in high school science classrooms.

Expanding the research field of writing self-efficacy to encompass mixed methods studies will benefit the field of motivation as a whole. In addition, if such research can lay the foundations for new instructional practices that aim to protect and promote self-efficacy in writing, decrease writing anxiety, increase strategy-use, and improve writing quality, such studies have the potential to inform practitioners in multiple classrooms. Ultimately, potential transformations have the promise of helping young writers, and on a broader level creating future generations of highly literate students who have the prospect of competing and succeeding in the global economy.

Theoretical Framework

Social cognitive theory is a theory of human functioning which emphasizes that most learning occurs in social contexts (Bandura, 1986, 1997; Schunk, 2012; Tudge & Winterhoff, 1993). The theory is indicative of Bandura's early years and influences of the renowned psychologists of the time and their theories; specifically, the drive-reduction theory of Hull and the Yale Institute of Human Relations, which developed what would become known as social learning theory. It was against this academic and theoretical backdrop, one that Bandura felt failed to account for social issues (Grusec, 1992; Tudge & Winterhoff, 1993), that he came to develop his social learning theory, which later evolved into his social cognitive theory (Bandura, 1986).

The roots of social cognitive theory are in the theories of imitation, latent learning, and social learning (Schunk, 2012; Tudge & Winterhoff, 1993). Proponents of imitation theory proposed that people have an inherent instinct to imitate others (James, 1890, as cited by Schunk, 2012). The limitations of the imitation construct included its

failure to account for actions carried out at future time points based on previously acquired knowledge and that it relied on reinforcement and previously acquired skills (Schunk, 2012). In short, imitation theory failed to consider rules and strategies that people adapt and utilize, and only considered discrete actions. The construct also lacked an agentic perspective, or the belief that people play an active role in their thoughts and actions as social cognitive theory proposes (Bandura, 2002). Later, latent learning theory evolved out of imitation theory and opened the way to account for learning that occurs without reinforcement. Furthermore, the theory proposed that learning could occur at one point in time and be stored for later use as opposed to having to be demonstrated immediately after exposure (Schunk, 2012). Despite improvements to imitation theory, due to its use solely with animals, latent learning failed to account for the role cognition plays in learning, which, similar to agency, social cognitive theory espouses is central to the learning process (Bandura, 1986, 1997; Schunk, 2012; Tudge & Winterhoff, 1993).

Beginning in the 1950s with Rotter's social learning theory of personality, an understanding that individuals act based on what they believe began to emerge (Rotter, 1966, as cited in Schunk, 2012). Bandura was also influenced by the work of Robert Sears, whose research attempted to recognize the role of both stimuli and psychoanalytic response in human action (Grusec, 1992). However, unlike social cognitive theory, social learning theory failed to recognize what are now acknowledged to be important cognitive self- influences such as: goal setting, self-evaluation, anxiety, self-regulation, and self-efficacy (Bandura, 1986, 1997; Schunk, 2012; Tudge & Winterhoff, 1993). Although progress was made towards what would become a social cognitive theory, it

was not until Bandura (1977, 1986) developed the theory that it would reach its more mature form and take into consideration the influence of constructs such as agency, self-efficacy, goal setting, self-regulation, interests, values, and other self-influential aspects of contemporary motivational theory.

In its contemporary form, social cognitive theory takes an agentic perspective to human development: that is to say humans are active participants in their thoughts and actions, and as such, have the capacity to exercise a measure of control over their lives in almost every area. This includes the domain of learning. Further, according to social cognitive theory, humans are not driven exclusively by internal forces, nor are they shaped exclusively by the environment; rather, they are shaped by the interaction of what Bandura (1986, 1989, 1997) refers to as determinants, and as such, individuals are players in their own lives and are thus necessary contributors in creating their own motivation. This postulate is a rejection of the popular theories of Bandura's early academic years which espoused the belief that behaviors were simple responses to external stimuli. Thus, Bandura rejected, and continues to reject, one-sided determinism. In fact, he explicitly stated his belief that theorists such as B.F. Skinner took one-sided determinism to extremes with behaviorism, as well as their assertion that behaviors are a result of a combination of present and past external stimuli (Bandura, 1986). In retrospect, Bandura appeared to be setting the stage for a theory that acknowledged not only behavioral aspect of humans, but also cognitive, biological, and affective traits, in addition to an understanding that humans do not develop in a vacuum: that is, they are inevitably impacted by their environments or contexts (Bandura, 1989).

Bandura's (1986, 1989, 1997) social cognitive theory promoted, and continues to promote the belief in a relationship he referred to as triadic reciprocality: that is, three classes of determinants exist in what Bandura referred to as triadic reciprocal causation (Bandura, 1986). According to Bandura (1989), it is this model of causation upon which social cognitive theory is founded; behaviors, cognitive and other personal factors, and environmental influences all play a part in determining behavior. This is a model that stresses the interdependence of relationships between any of these three determinants. In the model provided by Bandura, it is evident from the bidirectional arrows that he does indeed reject the concept of a one-sided relationship. He is careful to point out that when he refers to determinism, he is referring to the reciprocal action between these causal factors, not of actions being determined independently of the individual. While the use of the word determinism is not without controversy, given that the visual model of the concept is implicitly bidirectional, as indicated by the arrows pointing in both directions (Bandura, 1997), it is evident, as seen in Figure 1, (Bandura, 1997), that Bandura's model emphasizes all aspects of the model are inextricably linked and thus cannot be separated.

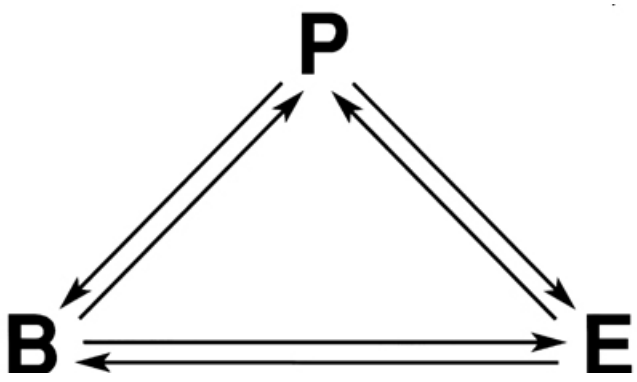


Figure 1. Reciprocal Interactions in Human Functioning.

As indicated in Figure 1, Bandura (1989, 1997) schematizes his concept to indicate that influences between the person, behavior, and environment are always bidirectional and personal and environmental factors rarely function independently, rather are influenced by each other and in turn affect one another. However, it is important to understand that social cognitive theory maintains that bi-directionality in no way indicates that particular sources of influence are of equal power. In other words, one determinant in the triadic reciprocal relationship can at any given time be of more or less influence on a behavior or action of an individual. For example, students who are highly efficacious about their writing might react to teacher criticism of their writing differently than students who are less efficacious about their writing. In such a scenario, the student who is more efficacious may be more influenced, though not solely, by the person aspect of Bandura's triadic reciprocal relationship and the less efficacious student by the environment. Of equal importance to the notion of triadic reciprocality, social cognitive theory suggests that there is interaction between thought and action; that is to say that what people believe and what they aspire for impacts the way they may choose to behave and react, and in turn outcomes of actions influence further thought and action (Bandura, 1986, 1997; Schunk, 2012).

Similarly, thoughts and actions are affected by, and further, may be altered by behavioral experiences and the environment. Looking at another bidirectional relationship within the triadic model, it is clear that social influences impact an individual's beliefs, values, and expectations. This may help shed light on how cultural norms are passed down from one generation to the next. Furthermore, social cognitive

theory maintains that the environment may act on an individual based upon appearance and typically recognized roles in society. For example, the way people act towards a young, African American male walking home from a convenience store at night wearing a hoodie may be different than how they react towards an elderly person based on nothing more than outward appearance and the associations that go with recognition.

Finally, while behavior has the potential to affect the environment, behavior may also be on the receiving end of such a relationship; thus, people are both producers of and products of their environments. Bandura specifically wrote, "Personal and environmental factors do not function as independent determinants; rather, they determine each other. People create, alter, and destroy environments. The changes they produce in environmental conditions in turn affect their behavior and the nature of future life" (1986, p. 23). Thus for Bandura (1986), social factors are both influencing and influenced by personal behavioral determinants (Tudge & Winterhoff, 1993).

Social cognitive theory takes the position that people have basic capabilities, subject to biology and maturation (Tudge & Winterhoff, 1993) and that development is based on these (Bandura, 1986, 1997). Bandura speaks of five specific capabilities as being instrumental in the development of individuals. Symbolizing capability is that which provides a way for individuals to adapt and alter their immediate environments (Bandura, 1986, 1997). Furthermore, it is through the ability to use symbols such as language and mathematical notation that individuals have the potential to synthesize and internalize experiences in order to help guide future courses of action. It is the human capacity to symbolize that gives meaning to previous experiences and thus allows

individuals to choose from alternative modes of response or courses of action. Humans, unlike other mammals, at some point in the course of their development can symbolically create scenarios in their head prior to acting; thus it is not necessary to learn only by the exhausting and potentially dangerous trial and error method. It is, according to Bandura (1986, 1997), a combination of symbolization and a mature cognitive capability that gives humans the ability to come up with novel ideas and to concoct thoughts beyond the actual scope of any lived experience.

While the symbolizing capability and mature cognition positioned by social cognitive theory imply the existence of ability to base actions on thought, hence a level of rationalization, it does not guarantee such a course of action (Bandura, 1986, 1997). The ability to rationalize is reliant on reasoning, a skill that is not necessarily used or developed by humans to its full potential. When individuals fail to maximize the ability to rationalize and reason, social cognitive theory would credit such shortcomings to individual failure; thus according to such theorists, the ability of humans to think can result in both positive and negative outcomes. It should be noted, shortcomings could be the result of multiple influences, such as environmental factors. In other words, individual failure is by no means always the result of the individual in isolation. Such a belief distinguishes social cognitive theory from theories that subscribe to one-sided determinism; such theories fail to acknowledge that no single factor can be an independent determinant in human action, and thus any suggestion of unidirectionality is inherently flawed.

The human capability of forethought is, according to Bandura's (1986) social cognitive theory, rooted in symbolic capability; there cannot be forethought without symbolic capability and symbolic capability is an acquired skill that occurs over time. That being said, it is in this instance that one may observe a similarity to Piaget's organismic view of human development. For Piaget, unlike Bandura, humans develop in stages, with each stage being dependent on the previous stage (Piaget, 1970). This is not to suggest a maturation approach is at work in either of these theories, just that there is a dependent relationship between certain skills. A simple example regarding symbolic capability would be that people cannot read without first learning to identify letters and make symbol-sound associations. Further, according to social cognitive theory, forethought capability is that which is beyond the realm of simple reaction. For example, humans have the ability to plan for hunger; they do not, like most animals only go in search of food in reaction to immediate survival needs (Bandura, 1986, 1997). It is forethought that spurs motivation and encourages individuals in their choices of action or inaction. In order to have forethought, individuals must rely on previously developed abilities to symbolize multiple possible scenarios or alternatives. Bandura's social cognitive theory posits that it is through the symbolizing capability that humans can use possible future outcomes as present or immediate motivators; in essence, according to social cognitive theory, future possibilities being "cognitively represented" (Bandura, 1986, p. 19) in the present provide casual efficacy for action. In the final analysis, humans have the unique ability to think ahead based on reflective, not simply concrete circumstances and thus can make long-term plans.

While symbolizing capability and forethought are useful traits, they are not maximally efficient. Social cognitive theory credits the ability for humans to learn vicariously or via indirect experience as being more efficient than the ability to learn by symbolizing capability (Bandura, 1986, 1997). Vicarious capability allows individuals to shorten the learning process through the observation of others. This ability is an important and unique aspect of being human and there is a relationship between the importance of a particular skill, most notably those that could be potentially dangerous, and the value of vicarious learning (Bandura, 1986, 1997). For example, humans do not have the intuitive or inborn skills to swim. Without the capability to learn vicariously, humans, who have relatively few natural instincts, would likely drown the first time they found themselves in deep water. They might jump in without an understanding of a potentially lethal outcome. In sum, learning vicariously is vital for human survival.

Humans, though they may not always act upon it, have the capability of self-regulation (Bandura, 1986, 1997, 2002). According to social cognitive theory, personal values and morals help people decide on a course of action, and this influence upon the self, does, in part determine an individual's behavior (Bandura, 1986, 1989, 1997, 2002). Closely related to self-regulatory capability is self-reflective capability. The ability to think about thinking or to be self-reflective is unique to humans (Bandura, 1986, 1989, 1997). It is through self-refection that Bandura believes humans make sense of the world around them and are able to alter their own thinking and perspectives on circumstances (Bandura, 1986, 1997, 2002). According to Bandura's social cognitive theory, a critical aspect of human development is self-efficacy, or people's perceptions of their own

capabilities to navigate different situations. People with higher levels of self-efficacy are more likely to be able to withstand challenges and overcome obstacles (Bandura, 1986, 1997, 2002; Schunk, 2012).

Bandura's social cognitive theory considers the role of fortuitous circumstances in the quest to explain why life paths occur the way they do (Bandura, 1989). Sociocultural aspects aside, there are events that occur that are, for all intents and purposes, according to Bandura, random. Chance encounters are an example discussed and the confluence of various factors that lead to a specific situation, which could have easily turned out quite differently (Bandura, 1982, 1986, 1997, 2002). That being said, while an event may be labeled as fortuitous, it seems that fortuitous events are heavily predicated upon culture and other social variables (Bandura, 1982, 1986, 1997). A chance encounter that occurs at an academic conference is ultimately only possible because of other preconditions such as education, ability to travel, and all of the variables that go into making such an event an option for an individual.

Bandura (1986, 1997) asserts that people have immense potential and that the multiple outcomes that occur are based on a combination of psychological traits and biological limits. For Bandura, it is the presence within humans of complex neural systems that allow for the existence of limited abilities at birth plus the possibility for more advanced capabilities to appear over time, "physical structure and sensory and neural systems affect behavior and impose constraints on capabilities" (Bandura, 1989, p. 3). Social cognitive theory takes the perspective that most patterns of human behavior are based on a combination of individual experience and neural codes, not some sort of

pre- programming (Bandura, 1989, 1997). Cognitions and behaviors have been shown to influence neural networks. In large part, humans build their brains. Genes do, according to this theory of human development play a role in behavior in that they influence potentiality. However, it is ultimately the coming together of the biological, experiential, and the physiological that sets the stage for behaviors (Bandura, 1986, 1989, 1997, 2002) or that social influences are constrained by biology and development (Tudge & Winterhoff, 1993). This being said, in line with the contextualist world view (Goldhaber, 2000) Bandura is critical of those who parcel out activities into innate and acquired activities. For example, in reference to Skinner who advocates that the environment is an independent force that acts upon individuals, Bandura stated that people are "foreactive, not simply counteractive" (Bandura, 1986, p. 22). This point of view is also critical of the existential and other personal deterministic views that claim people are the sole determinants in their own thought processes in addition to their own destinies.

The social cognitive theory described by Bandura in 1986 was an emphatic reaction to the prior unidirectional theories Bandura was surrounded by, particularly during his early academic career (Schunk, 2012; Tudge & Winterhoff, 1993). As might be expected, in writing about his social cognitive theory, Bandura is highly critical of such theories (Bandura, 1986, 1989, 1997, 2002). In fact, he went as far as to write, "For every chicken discovered by a unidirectional environmentalist, a social cognitive theorist can identify a prior egg" (Bandura, 1986, p. 39). According to Bandura (1986, 1997, 2002), environmental determinism, which is based on the premise that behavior is controlled by situational influences and in line with both the contextualist and organismic

world views (Goldhaber, 2000) fails to acknowledge human behavior is more than simply a reaction to environmental stimuli. Furthermore, in failing to acknowledge the interactive relationships of people and their environments, behaviorists and others who espouse a unidirectional point of view, mistakenly believe when considering behavior, that people and their environments can be regarded as entities independent of one another. For Bandura, this does not make sense as behavior is affected by a combination of people and their environments, and thus it is impossible to separate them (Bandura, 1986, 1997). Similarly, claiming that partial directionality solves the issue is erroneous for Bandura, as acknowledging that there is a relationship of one on the other falls short of understanding that the relationship must always be bidirectional. Despite its strengths, there is often a disconnect between the theory and the research. The model of triadic reciprocality is dynamic, however research based on the model attempts to isolate effects at static points in time.

Research Questions

Using social cognitive theory as a guiding conceptual framework, this study addressed the following research questions to help evaluate the impact of a writing intervention.

1. How efficacious are high school students in upper grade science classes about writing research papers before, during, and after a writing intervention?
2. How apprehensive are high school students in upper grade science classes when writing research papers before, during, and after a writing intervention?

3. How do they perform when writing research papers before, during, and after a writing intervention?
4. Can a writing intervention with a motivational component increase student writing self-efficacy, reduce student writing apprehension, increase the use of strategies when writing research papers, and improve the quality of research papers?

CHAPTER II

REVIEW OF THE LITERATURE

The purpose of this literature review is to examine the constructs of self-efficacy, self-regulation, and writing apprehension. Additionally, this review examines the literature on adolescence, SRSD, goal theory, strategy-use, writing and self-efficacy, and writing in science. Since adolescence is a time of increased risk for school failure and risk-taking behaviors in general (Bandura, 2006), it is imperative to make an effort to understand the reasons for this, and to prevent behaviors which culminate in dropping out of high school. Self-efficacy is a construct that has been shown to have a strong impact on the choices individuals make and the subsequent paths they follow, both in school and other domains (Allison, Dwyer, & Makin, 1999; Bandura, 1986, 1997; Bandura, Barbaranelli, Caprara, & Pastorelli, 2001; Caprara, Pastorelli, Regalia, Scabini, & Bandura, 2005; Feltz & Magyar, 2006; Kane, Marks, Zaccaro, & Blair, 1996; Kiran-Esen, 2012; Pajares, 1996; Pennanen, Haukkala, De Vries, & Vartiainen, 2011; Schunk & Meece, 2006; Schwarzer & Luszczynska, 2006). More specifically, research has shown that students who are more efficacious are likely to work harder and persist when they encounter difficulties (Klassen, 2002; Pajares, 2003; Schunk, 2003; Schunk, Pintrich, & Meece, 2008) as they have positive beliefs about their abilities to be successful in given tasks. Since writing in high school is a complex, multi-faceted task that requires

sustained attention (Harris et al., 2008; Hayes & Flower, 1980), the construct of self-efficacy as it relates to writing is particularly important during the adolescent years.

Self-efficacy is part of Albert Bandura's (1986) social cognitive theory, which takes an agentic perspective to human development. According to social cognitive theory, humans are not driven exclusively by internal forces, nor are they shaped exclusively by the environment; rather, they are shaped by the interaction of factors, both from within the individual and the external environment (Bandura, 1986). In what Bandura (1986) refers to as a triadic reciprocality, individuals are considered both the products and producers of their environments. Adolescents are affected by the environments in which they interact, hence those around them have the potential to foster or alternatively inhibit the development of self-efficacy. Given that adolescents can be a strain on their environments, the interactions they have with environments, such as school, may not be conducive to the protection and/or enhancement of self-efficacy.

While inherent ability and skill are critical in school and life in general, such traits by themselves are not sufficient to maximize the potential for successful outcomes. How adolescents view themselves and their own abilities is critical to choosing activities, to persisting in the face of the inevitable frustration and failure that may accompany school, and ultimately to experiencing successful academic outcomes (Pajares, 1996). Students with low levels of self-efficacy are more likely to achieve lower grades, less likely to choose challenging, high-level classes, more likely to produce substandard writing products, and ultimately more likely to drop out of high school as the biopsychological state of adolescence converges with increased pressures and demands from the

environment. Conversely, students with higher levels of self-efficacy are more likely to achieve higher grades, choose challenging courses, produce quality written products, and to graduate from high school—tendencies bolstered by personal beliefs in ability and the propensity to persevere when faced with adversity (Pajares, 1996).

The following review of the literature is broad in scope and is organized into the sections that encompass the literature related to the constructs addressed in the study. Given the broad scope of the review, the initial section reviews the literature that backs up the claim that adolescence is a turbulent time during which adolescents are at increased risk of negative attention from their environments. Following is a review of the literature on self-efficacy in general, which shows how the construct is a powerful force across multiple domains, both in and out of school. Next is a review of Zimmerman's model of self-regulation and the related writing literature. As the review focuses more towards the academic domain of writing, a review of Self-Regulated Strategy Development is presented, followed by a review of the literature on writing apprehension, which has clear connections to and perhaps foreshadows the work on writing self-efficacy. Given the value that goals have brought to writing performance, the literature on goal theory to include how goals can be used to enhance student performance. The value of strategy is reviewed prior to moving to the section in this literature review, which relates to writing and self-efficacy. Since much of the research has been conducted at the elementary and college level, this review covers the available literature on writing self-efficacy at all levels, with an understanding that adolescents are present in

schools starting as early as third grade, but certainly in fourth grade and beyond. The final section reviews the literature on writing in science.

Adolescence

Adolescence is a time of rapid change in young people as they transition from being a child to an adult. As a bridge to adulthood, it is a time when the multiple physical, social, and academic changes adolescents undergo may result in a sense of confusion and loss (Klassen, 2002). Along with increased responsibility and higher expectations in life in general, adolescents face some of the most critical and challenging academic tasks of their lives. As adolescents enter high school, the demands in all academic subjects increase exponentially (Anderman & Mueller, 2010; Eccles et al., 1993; Meece, Herman, & McCombs, 2003). Simultaneous to physiological and environmental changes, adolescents are often viewed as obnoxious, oppositional, and resistant by the adults surrounding them as they go through changes on multiple levels from physical to social to cognitive (Eccles et al., 1993; Meece et al., 2003; Schunk & Meece, 2006; Schunk & Miller, 2002). These behaviors may promote responses from the adults around them that may undermine self-efficacy (Bandura, 2006).

During adolescence, young people may find themselves more alienated from the people closest to them, both adults and peers as they try to navigate a world that is no longer that of a child, but neither that of an adult. Adolescents might be confused by societal messages that simultaneously encourage and dissuade increased independence; for example, parents might feel that their adolescents should be mature enough to make wise decisions regarding school, but at the same time believe that they are not mature

enough to make wise choices about where they go, when, and with whom. Additionally, students may experience adults saying things such as, “you are 17, you should be able to deal with this” and “you are 17, you are not old enough to deal with this.” It is easy to see how such interactions are the cause of confusion and disagreement and how as a result, many adolescents have strained relationships with adults and thus may lack emotional and psychological support during tumultuous times. At the very time adolescents require increased nurturance of self-efficacy beliefs in ability to be successful at school and beyond, the personal and environmental characteristics of adolescents might make this less likely than at any other time in their academic lives (Anderman & Mueller, 2010; Eccles et al., 1993).

While many individuals develop during adolescence without major upheaval or problems, several do experience heightened stress, volatility, and ultimately difficulty within multiple settings and relationships, including school, family (Anderman & Mueller, 2010; Eccles et al., 1993; Schunk & Meece, 2006) and peers (Hamm & Zhang, 2010; Schunk & Meece, 2006). This problem is magnified in large urban schools where students are acknowledged to be disengaged and teachers are at a loss as to how to help such students (Mullen & Schunk, 2011). Adolescence in general is perceived to be a time of increased risk for dropping out of high school, with 30% of adolescents in the U.S. dropping out of school prior to obtaining a high school diploma (Darling-Hammond, 2010). This number is disproportionately high among certain ethnic groups, up to 50% in the 50 largest cities in the U.S., as urban students find themselves increasingly detached

from learning and school (Darling-Hammond, 2010; Eccles et al., 1993; Mullen & Schunk, 2011).

Adolescence is a time during which changes in self-efficacy and related motivational constructs such as goal setting, values, expectancies, attributions, and interest typically occur (Eccles, Wigfield, & Schiefele, 1998; Klassen, 2002; Schunk & Meece, 2006; Schunk, Pintrich, & Meece, 2008; Wigfield et al., 1997). These changes, particularly during the transition from elementary to middle school, are negative for the most part (Anderman, Maehr, & Midgley, 1999; Anderman & Mueller, 2010; Eccles et al., 1993; Jacobs, Lanza, Osgood, Eccles, & Wigfield, 2002; Schunk & Meece, 2006; Schunk & Miller, 2002), although there are exceptions. Shell, Colvin and Bruning (1995) found increases in self-efficacy in the domains of reading and writing, and Zimmerman, Bandura, and Martinez-Pons (1992) found a positive developmental trend with regard to self-efficacy in math and verbal skills. Given that much of the research on self-efficacy supports the hypothesized relationship between self-efficacy and academic achievement in multiple domains and that adolescence is a critical time in the life course, research on the impact of self-efficacy during adolescence in multiple academic domains is warranted.

Self-Efficacy

Self-efficacy is part of Bandura's social cognitive theory and is defined as "peoples' judgment of their capabilities to organize and execute courses of action required to attain designated types of performances" (Bandura, 1986, p. 391) and was first introduced into the academic field by Albert Bandura in 1977. As a construct, self-

efficacy has far reaching effects on personal agency and on the choices and people make, as well as the paths they follow (Pajares, 1996). Bandura (1997) went as far as to say: "beliefs of personal efficacy constitute the key factor in human agency" (p. 3). While skills and competencies are necessary for performance, they in themselves are not sufficient to ensure successful and/or maximal functioning. It is hypothesized that self-efficacy influences peoples' choices in which activities to pursue—for example, class rigor in high school, the amount of effort to put into a task, willingness to complete activities, and the ability to persevere when faced with adversity (Schunk & Lilly, 1984). According to social cognitive theory, it is self-efficacy that helps determine how far individuals are willing to go, and how hard they are willing or able to push themselves to optimize the chances of positive outcomes (Bandura, 1986, 1997).

People constantly find themselves in situations where a decision must be made on a particular course of action; perceptions of self-efficacy are critical in generating possible outcomes (Bandura, 1982, 1986, 1997). When people have little belief they can influence outcomes, it is logical there is little motivation to act (Bandura, 1986, 1997; Bandura et al., 2001). Bandura (1986) proposed that self-efficacy beliefs evolve from four sources: action/performance attainments, vicarious experience, verbal persuasion, and physiological reactions.

Action/performance attainments, also referred to as mastery experiences (Usher & Pajares, 2008), are the most powerful source of self-efficacy (Bandura, 1986, 1997). When individuals engage in tasks such as those required for success in school and work, success or failure will have an impact on self-efficacy and help limit or enhance

motivation for future action. Individuals who are successful in tasks will likely conclude that they have the capability to continue to be successful, while those who are unsuccessful will conclude the opposite. Persons with higher levels of perceived self-efficacy are more likely to engage in activities which have higher rates-of-return on effort, for example enroll in more rigorous classes in the school setting. When faced with difficulty and adversity, people with lower levels of perceived self-efficacy are more likely to give up and suffer higher levels of stress related to such tasks (Bandura, 1982).

While mastery experiences are postulated to be the most powerful sources of self-efficacy, (Bandura 1986, 1997), vicarious experiences, or modeling influences are also hypothesized to affect self-efficacy. It is vicarious capability which is far more efficient that social cognitive theory credits with the ability to learn via indirect experience (Bandura, 1986, 1997). Vicarious capability allows individuals to shorten the learning process through the observation of others. Students who feel confident in their abilities have the opportunity to learn by watching others as they become familiar with skills they can us at a later time. The ability to shorten the learning process is an important aspect of being human, and there is a relationship between the importance of a particular skill, most notably those that could be potentially dangerous and the value of vicarious learning. Bandura includes culture as a trait that is learned vicariously and stresses that technology has provided for increased opportunities for vicarious learning (Bandura, 1997).

In addition to mastery experience and vicarious learning, verbal or social persuasion is believed to be a powerful source of self-efficacy (Bandura, 1986, 1997).

Verbal or social persuasion may exert a powerful influence on efficacy beliefs. When people are provided information by significant others which bolster self-beliefs, individuals have enhanced motivation to act, and thus levels of self-efficacy are likely to increase. Conversely, when significant others undermine beliefs of capability through words and actions, self-efficacy may be eroded (Bandura; 1986, 1997). It intuitively makes sense that how significant others in students' lives, such as parents, teachers, and peers interact with them could potentially impact self-beliefs. In addition, societal forces, while perhaps further removed from individuals, may impact self-efficacy. If students feel encouraged in meaningful and authentic ways, it seems natural they would feel more motivated, work harder, persist in the face of difficulty, and have better outcomes than students who receive negative, inauthentic, or no encouragement. That being said, it is important to note that both vicarious experience and verbal persuasion rely on eventual substantiation through successful performance for positive effects on self-efficacy to endure.

The final source of self-efficacy discussed by Bandura (1986, 1997) involves the physiological reactions individuals have to situations and/or experiences. Tasks that create high levels of anxiety and other physiological symptoms are believed to erode self-efficacy, and thus impact future decisions and outcomes. This is logical as most people naturally and intuitively seek to avoid unpleasant situations. If students feels anxious or stressed every time they sit down to work on a research paper, they may procrastinate and ultimately undermine their chances for optimal success on such a project.

Given the generative effects of self-efficacy (Bandura, 1986), the potential for self-efficacy to predict outcomes (Pajares, 1996), and evidence indicating the critical nature of self-efficacy in human development, adaptation, and change (Holden, 2001; Multon, Brown, & Lent; 1991, as cited in Bandura, 2006), the literature on the topic of self-efficacy is expanding. Self-efficacy has now been examined in multiple spheres of functioning including, but not limited to: sports (Feltz & Magyar, 2006; Kane et al., 1996; Treasure, Monson, & Lox, 1995), physical activity (Allison et al., 1999), academics (Schunk, 2003; Usher & Pajares, 2008), health and risk-taking behaviors (Schwarzer & Luszczynska, 2006), smoking (Pennanen et al., 2011), career choices (Bandura et al., 2001), and peer pressure (Kiran-Esen, 2012). In addition, other research on self-efficacy has considered it from a more distal perspective, for example as an indicator of family functioning and satisfaction (Caprara et al., 2005) and its impact on teaching and self-regulation.

Self-Regulation

In the 1970s and early 1980s, educational psychologists began to view learning differences amongst individuals from a new perspective. In contrast to the fixed ability premise, which had prevailed up until that time, a new idea postulated that students' differences were based on varying levels of metacognitive awareness of personal strengths and weaknesses, and in the presence of weaknesses, the ability to compensate for such shortcomings. In short, the concept of self-regulation emerged as a primary explanatory factor for individual differences in students' learning and outcomes: this

school of thought has prevailed since that time (Zimmerman, 2002b) and research has substantiated initial claims and findings.

Early research involving a combination of questionnaire measures and interviews showed students' self-regulatory strategy use was significantly correlated with measures of academic performance (Zimmerman & Martinez-Pons, 1986). Later research indicated that self-regulatory strategies mediated the effects of students' verbal ability on their outcomes in writing performance (Zimmerman & Bandura, 1994). That is to say, students who used strategies effectively were able to perform at higher levels than would have been expected in consideration of verbal ability alone. Pintrich, Smith, Garcia, and Mckeachie (1993) found that students who used self-regulatory strategies were more likely to learn more and seek out help as needed from teachers, peers, and parents. It is evident that teaching students self-regulatory strategies and having them practice them has powerful implications across multiple domains, including academic (Schunk & Zimmerman 2007b).

According to Zimmerman (2008), studies in self-regulated learning emerged as a way to help researchers answer questions as to how students "become masters of their own learning processes" (p. 166). Assumed in Zimmerman's model of self-regulation is the belief that positive motivational beliefs, in addition to metacognitive strategies play a part in student-learning (Schunk & Zimmerman, 1997). Thus, self-regulation is not an inherent trait or an academic skill, but a set of self-directed processes that enable students to convert their mental abilities into academic skills and positive academic outcomes (Zimmerman, 2002b). In summary, self-regulation involves students' proactive use of

select responses or processes to improve and/or optimize achievement in academic and other settings.

In order to be successful in the school setting, students require more than the requisite academic skills; they must know how to use and harness self-regulatory and motivational behaviors. While content knowledge is necessary for academic success, it is unlikely such knowledge alone will promote academic success. On the other hand, students with less inherent academic ability and less understanding of content may be able to perform better than predicted by traditional intelligence tests due to more advanced self-regulatory skills and motivational affect. While definitions of self-regulation may differ dependent on theoretical orientation, for the most part, definitions contain a metacognitive, motivational, and behavioral component and an implication that all three components are integral to student learning and learning outcomes (Zimmerman, 1990).

Self-regulation was defined early on by Zimmerman (1989, 1990) as "processes that activate and sustain cognitions, behaviors, and affects, and that are oriented toward goal attainment" (Schunk & Zimmerman, 1997, p. 195). However, Zimmerman contended that a pivotal moment in defining the concept of self-regulation came in 1986 at a symposium at the American Education Research Association annual meeting; a meeting attended by preeminent researchers in the field, including, but not limited to, Karen Harris, Judith Meece, Paul Pintrich, and Dale Schunk. At this time, an inclusive definition of self-regulation was adopted as, "the degree to which students are metacognitively, motivationally, and behaviorally active participants in their own

learning process" (Zimmerman, 2008, p. 167). Key components of self-regulation therefore involve cognitive, metacognitive, motivational, and affective aspects. Furthermore, Schunk and Zimmerman (1997) specified that self-regulatory processes include planning and time management, paying attention in class, being organized, strategically coding and practicing information, creating and maintaining a productive work environment, and using resources efficiently. They further contended that self-regulation has a motivational aspect, incorporating motivational processes such as setting performance goals and outcomes, having positive beliefs about one's capabilities to execute tasks or self-efficacy, placing value on learning and its potential outcomes, and having positive affective experiences (Schunk, 1994; Schunk et al., 2008).

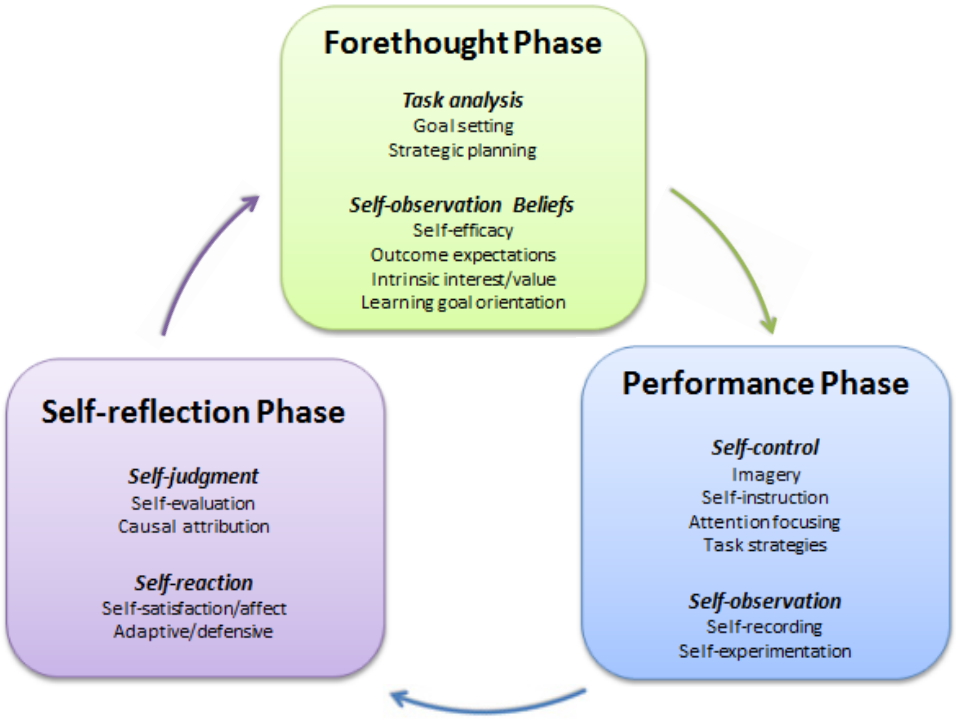
An integral component of Zimmerman's model, a model which is being increasingly applied in educational settings, includes self-regulatory strategies, which were defined as, "specific processes and associated actions designed to acquire or display a skill" (Zimmerman, 2002a, p. 13). Self-regulated learners accept responsibility for their learning outcomes, understand they have choices, and recognize they are active participants in the acquisition of knowledge (Schunk et al., 2008; Zimmerman, 1990; Zimmerman & Martinez-Pons, 1986). Social cognitive researchers, in line with, and building on these definitions, view self-regulation as a "domain specific level of acquired skill that depends on several task-dependent processes, such as planning, strategizing, developing motoric proficiency, and self-monitoring" (Schunk & Zimmerman, 1997).

In 1998, Zimmerman defined academic motivation as one's "self-generated thoughts, feelings, and actions for attaining academic goals" (p. 73). Zimmerman's

model of self-regulation takes a social cognitive, phase perspective. That is to say, in contrast with maturation theorists such as Piaget (1970), who believed development impedes learning, a phase perspective advocates that learning and development of self-regulation are reciprocally beneficial (Schunk & Zimmerman, 1997). Zimmerman described self-regulatory processes in terms of three cyclical phases (Zimmerman, 2000). Embedded in this model is an explanation of how students progress in terms of learning processes, levels of self-awareness, and motivational beliefs to become self-regulated learners. Zimmerman's model explicitly described three phases of self-regulation through which students progress when engaging in an academic task. As is depicted in Figure 2, microanalytic measures have been developed to ascertain self-regulatory learning processes and motivational beliefs in the cyclical model developed by Zimmerman.

Phase one of the model, known as the forethought phase, comes prior to actual performance and effectively prepares learners for action (Schunk & Usher, 2013). Within the forethought phase are two subclasses of forethought: task analysis and self-motivation. Task analysis encompasses goal setting and strategic planning. Prior to engaging in a task, learners may set goals and engage in strategic planning (Schunk & Usher, 2013). Motivational elements are also critical as the level of self-efficacy for learning a task, for example, may impact effort and ability to persist while involved the task. Goal setting is a motivational activity and strategic planning is a cognitive process. Evidence exists to support the premise that students, who set goals which are specific and proximal in nature, experience increased levels of academic success (Schunk & Swartz,

1993a; Zimmerman, 2002a, 2002b). Self-motivation evolves from students' personal beliefs about learning. Personal beliefs include self-efficacy, intrinsic interest or value, outcome expectations, and learning goal orientation—constructs discussed at length by Bandura (1986, 1997). It should be remembered when examining the phases of self-regulation, that they are dynamic and recursive in nature.



Adapted from Zimmerman and Campillo (2003), as cited in Zimmerman (2008)

Figure 2. Phases and Subprocesses of Self-regulation.

The second phase of Zimmerman's model is the performance phase, also referred to as volitional control (Schunk, Pintrich, & Meece, 2008; Schunk & Usher, 2013). Like the forethought phase, this phase also contains two major subclasses: self-control and self-observation. Self-control refers to cognitive processes such as implementing the

strategies that were selected during the forethought phase. Methods of self-control include imagery, self-instruction, attention focusing, and task strategies (Zimmerman, 2002b). It is self-control that helps keep learners engaged in a task and motivates them to improve their performance (Schunk & Usher, 2013). Self-observation refers to metacognitive behaviors such as self-recording personal events and self-experimentation. An important aspect of self-observation is the accuracy of such observations. Learners, who assess themselves and their progress inaccurately, will find it difficult to use the information in a positive way to improve learning outcomes (Schunk & Usher, 2013). Through such metacognitive processes, students can monitor progress, ascertain to what extent strategies are working, and think of ways to adapt.

The final phase of the three phase model is the self-reflection phase. The two major subclasses of the third phase are self-judgment and self-reaction. It is at this point that learners stop while engaged in an assignment and again when the assignment is complete for reflective purposes (Schunk & Usher, 2013). This phase contains affective and metacognitive aspects such as self-judgment and causal attribution in the self-judgment class and self-satisfaction and adaptive/defensive responses in the self-reaction phase (Zimmerman, 2002b). Self-judgment refers to evaluating one's performances. When learners judge themselves to be making adequate progress in a task, they are likely to be more motivated and self-efficacious. Attributions are the perceived beliefs about reasons for performance and are an important part of self-regulation. Learners, who attribute their successes and failures to factors within their control, are more likely to

maintain self-efficacy than those who attribute them to outside forces (Schunk et al., 2008; Schunk & Usher, 2013).

It is important to note that Zimmerman's three phase model of self-regulation is cyclical in nature in that information gleaned from one phase affects other phases. For example, self-reflections from previous endeavors to learn may have an impact on future forethought processes. This might be seen in a student who feels dissatisfied with his or her performance in stage three, which may reduce self-efficacy, and ultimately lead to less effort and motivation for future learning tasks (Zimmerman & Bandura, 1994). Conversely, a student who feels dissatisfied with his or her results in the self-reflection phase might use such information to propel him or her to make better decisions during the forethought phase; decisions more likely to produce desired outcomes.

As well as the three phase model presented, Zimmerman also addresses the process through which self-regulatory skills are developed; levels of self-regulatory development that can be used to help teach students. In this model, it is postulated that the development of self-regulatory skills occurs across four levels, starting via external or social sources, and as one evolves through the levels, internal sources take over and replace the earlier external forces that encouraged self-regulation (Schunk & Zimmerman, 1997; Zimmerman, 2000). Within this model, as can be seen from Table 1, are four levels of regulation or milestones that are proposed to lead the way to self-regulatory skill: observation, emulation, self-control, and self-regulation (Schunk et al., 2008; Zimmerman, 2002b).

The first level, or the observational level, is the point at which learners rely on models or social, external sources to learn from. At this stage, learners are starting to acquire the basic skills and strategies from a model's performance or coaching. It is by watching models that learners begin to form cognitive representations of skills and a fundamental understanding of them (Schunk & Usher, 2013). An example is when a teacher is explicitly modeling a skill or process they are teaching their students. In summary, at the observational level of regulation, the sources of regulation are external, or models, the source of motivation is vicarious reinforcement, the task conditions are the presence of models, and the performance index is discrimination (Zimmerman, 2002b). A learner has reached an observational level of skill when he or she has the ability to notice subtle, qualitative levels in models' performances. This level is associated with social cognitive theory's emphasis on the importance of observational learning (Bandura, 1997).

Table 1

Social and Self-Sources of Regulation (Zimmerman, 2002b)

Levels of Regulation	**Sources of Regulation**	**Sources of Motivation**	**Task Conditions**	**Performance Indices**
Observation	Modeling	Vicarious reinforcement	Presence of models	Discrimination
Emulation	Performance and social feedback	Direct/social reinforcement	Corresponds to models	Stylistic duplication
Self-control	Representations of process standards	Self-reinforcement	Structured	Automatization
Self-regulation	Performance/outcomes	Self-efficacy beliefs	Dynamic	Adaptation

The second level is the point at which learners begin to attempt to duplicate the model's performance. While learners at this point may not be able to replicate exactly model performance, they do have the ability to perform at a basic or rudimentary level. Learners have heightened chances of successful emulation if models provide them with encouragement and feedback (Zimmerman, 2002b), for example, when a teacher tells a student they are doing well as they engage in independent practice of a skill. This level, like the observational level, is social or external since learners still require models in order to perform (Schunk & Usher, 2013). At the emulation level, the sources of regulation are performance and social feedback, the sources of motivation are direct and social reinforcement, the task conditions correspond to models, and the performance index is stylistic duplication. Further, Zimmerman (2002b) maintains that a learner has acquired an emulative level of skill when he or she is able to perform similarly, if at a more basic level, than models on a comparable task. The first two levels of the model are implicitly social in character, requiring outside forces of academic skill (Schunk et al., 2008).

It is at level three, self-control, that learners begin to exhibit the ability to use the skills and strategies they have learned in the prior two stages in novel or independent settings and that the model begins to emphasize self-sources of academic skill (Schunk et al., 2008). Learners no longer require the presence of models to perform (Zimmerman, 2002b). For example, following a modeling encounter and independent practice, a learner may work on an assignment independently, such as homework, during which time they still rely on the memory of the model to make progress. It is important to note that

while internalization does occur at the self-control level, it is anchored in memories or representations of model behavior; learners are not yet able to operate in ways that permit them to modify internally or adapt as necessary in given situations (Schunk & Usher, 2013). At the self-control level, the source of regulation is representation of process standards, the source of motivation is self-reinforcement, the task condition is structured, and the performance index is automatization (Zimmerman, 2002b).

While it is at the self-control level that learners begin to internalize models' techniques, it is not until level four, self-regulation, that learners become truly independent of external models (Zimmerman, 2002b). A learner at this level is able to take what he or she has learned and apply it in novel contexts, or adapt, in order to use strategies, such as when a student takes a strategy or skill he or she has learned in one class and applies it effectively and independently to an assignment in a different class. For learners, who have achieved this level, the sources of self-regulation are performance and outcomes, self-efficacy beliefs are the source of motivation, the task conditions are dynamic, and the performance index is adaptation. At the self-regulation level, learners are able to adapt skills and strategies as necessary in given situations. At this stage, learners have fully internalized skills and strategies and have the ability to adapt how and what they are doing, contingent upon changing personal contexts, expectations, and outcomes (Schunk & Usher, 2013; Zimmerman, 2002b).

In summary, Zimmerman provided a theory and models of self-regulation that addressed self-regulatory processes before, during, and after engagement in tasks, both of which are highly relevant in educational contexts. Furthermore, his model views self-

regulation as cyclical in nature, which corresponds with Bandura's (1986) model of reciprocal interactions among personal, behavioral, and social and environmental factors. Most importantly, with reference to students, learning, and education, Zimmerman's model presents a framework by which cognitive, metacognitive, motivational, and affective self-regulatory processes may be addressed in educational settings. Research has supported the premise that teachers can encourage self-regulated learning in their classrooms (Schmitz & Wiese, 2006; Stoeger & Ziegler, 2008).

Bandura stipulates that self-efficacy and self-regulation are critical processes that impact student learning and achievement (Bandura, 1997). Given this premise, it is logical that a body of research has materialized and continues to emerge that explores these critical processes across academic domains. Writing is one academic area that has received attention from researchers using a social cognitive perspective, and through such research, it has been found that in addition to verbal abilities, cognitive and motivational aspects also play a role is student writing performance (Zimmerman & Bandura, 1994). More specifically, in addition to self-efficacy, an additional, important motivational variable, self-regulation, has been found to impact student writing (Schunk & Zimmerman, 2007a). While self-efficacy refers to students' perceived capabilities to attain goals at designated levels (Bandura, 1986), self-regulation refers to self-generated thoughts, feelings, and actions that are systematically designed to affect one's knowledge of learning and skills (Zimmerman, 2000, 2008).

Writing research that contains a self-efficacy and self-regulatory component includes two studies conducted by Schunk and Swartz in 1993. In their studies of

elementary school students, they found that modeled strategy instruction, combined with setting goals and feedback, not only increased students' writing skills and self-efficacy, but also that students were able to use the strategy outside of the immediate context in which the strategy was taught—or move to a more advanced level of self-regulation (Schunk & Swartz, 1993a; 1993b).

Results from the experiments indicated a positive relationship between goals and feedback and levels of self-efficacy and skills. Overall, the value of the study highlighted the roles that the self-regulatory skill of goal setting and feedback can play in enhancing both writing self-efficacy and writing skills. The study further indicated the potential value of incorporating strategy instruction into the curriculum and the second study suggested that the goal of using a strategy with gifted students transferred into another assignment six weeks later. The results of the experiment with gifted students, while slightly different in method, yielded similar results with reference to goals and feedback and levels of self-efficacy (Schunk & Swartz, 1993b).

In these studies, students exhibited behaviors and outcomes that showed progression across Zimmerman's four stages. In the first study, students used the modeling from social sources they received, feedback, and practice, in combination with learning goals and evaluation of strategy effectiveness to move to Zimmermann's self-controlled level. The gifted students in the second study, through their abilities to maintain and transfer skills to other contexts, or adapt, suggested they had moved into Zimmerman's self-regulated level (Schunk & Zimmerman, 2007a).

Zimmerman and Kitsantas (2002) conducted a study to test the influences of modeling and social feedback on the writing skills of 72 college students. Based upon Schunk and Zimmerman's (1997) model of self-regulatory of sequential skill acquisition, the researchers postulated that learners could learn new writing skills as they progressed through the four levels of observation, emulation, self-control, and self-regulation. Prior research is cited as evidence that sequential learners can reach the self-control and self-regulation levels through instructional interventions more effectively than non-sequential learners. Zimmerman and Kitsantas (2002) were specifically interested in the role of the observational and emulative levels in the acquisition of writing revision skills. They reported research that confirmed the positive impact of self-regulated strategy development and modeling on various aspects of writing. By pointing out the lack of research at the time that tried to separate the effects of modeling in the observation phase from those of emulation, Zimmerman and Kitsantas (2002) made an important contribution to the field of self-regulatory writing research.

In the study, researchers focused on instruction designed to maximize the effects of observational and emulative learning on writing-revision skills, self-efficacy beliefs, intrinsic interest, and self-reactions. The study addressed the cognitive, metacognitive, motivational, and affective aspects of Zimmerman's model of self-regulation. Their hypotheses were as follows: learners who observed an adult coping model would outperform learners who observed a mastery model. They further hypothesized that learners who received no modeling would underperform both the mastery and the coping models. There was also a feedback aspect to the study. With that in mind, the

researchers further hypothesized that learners who received feedback during emulative learning, would have an even greater advantage over those who just received the modeling. In summary, it was predicted that in the posttest phase of the study, the effects of modeling and social feedback would be additive in nature (Zimmerman & Kitsantas, 2002). Finally, researchers hypothesized that feedback would lead to an increase in student motivation and thereby further enhance the acquisition of writing skill. It was expected that students who tried to acquire skills independently without the support of models would show the weakest writing skills, as well as lower motivational affect.

Results supported the sequential aspect of the self-regulatory model proposed by Schunk and Zimmerman (1997) with reference to acquiring writing skills. It was found that students' degree of observational learning significantly influenced subsequent learning during the emulation level or during independent practice. Further, as hypothesized, students who observed the coping model performed at a higher level than those who observed the mastery model or who completed the tasks in the absence of the model experience. The hypothesis that observational learning would positively impact both self-efficacy beliefs and self-satisfaction was also upheld. Social feedback was found to positively impact all levels of observational learning. At the emulative level, social feedback did not show statistical significance, but it did prove to advance writing skills during the posttest phase compared to the group that received no social feedback.

A surprising result of the study involved students' self-efficacy beliefs; it was found that students were not particularly accurate in self-evaluating their efficacy beliefs. All students in the modeling groups indicated relatively high levels of self-efficacy.

Students, did however, change their efficacy beliefs to correspond more accurately with the information they received based on writing outcomes. Ultimately, students in the coping model group showed most improvement in practice problems and the least decline in self-efficacy beliefs during the posttest phase (Zimmerman & Kitsantas, 2002). Post-test self- satisfaction and intrinsic interest levels, critical processes at the self-control and self-regulation levels of social cognitive functioning, were also found to be highest in the coping-model group.

This study showed the power of coping models to impact learners in the observational level of this self-regulation model. Additionally, it confirmed the sequential characteristic of the observational and emulation levels with relation to writing revision skill acquisition. Further, the degree of student observational learning significantly influenced later learning during emulative practice. As postulated by social cognitive theory (Bandura, 1986), coping models, who demonstrated their trials and errors, were more influential in observational learning and practice. Finally, the coping model experience led to more advanced forms of self-regulation, such as intrinsic interest and higher levels of self-satisfaction than mastery models, although accurate levels of self-efficacy beliefs related to writing revision required both modeling and emulative performance. In this study, all four aspects of Zimmerman's model of self-regulation were addressed: modeling with practice observational and emulative, process goals, the self-controlled level, and outcomes goals, the self-regulated level. Evidence was provided that writing interventions that acknowledge the sequential nature of self-

regulation and the positive role of models and goals offer much promise for instructing writing across the curriculum.

In a study by Bruning, Demspey, Kauffman, and McKim (2013), researchers examined a novel perspective on writing self-efficacy, building on the idea that not only is self-efficacy critical for successful writing performance, but that it is tied to other critical variables related to writing, including self-regulation. While this study does not use Zimmerman's model in its exact form, it does build on his model in order to add to the growing body of literature on writing and self-regulation. The two studies discussed were based on research which has shown the strong positive effects of strategy instruction on writing performance and emphasizes ideation and language-related processes. The researchers came up with three classes of activities they believed played a part in the act of writing: generating ideas or ideation, expressing such ideas using conventions, and managing writing decisions and behaviors. This third class represents the self-regulatory aspect of writing.

As with most other researchers in the writing field, Bruning et al. (2013) considered writing to be a highly recursive process and thus did not consider these three domains to be sequential. The researchers stated that a goal of their work was to address missing information in the literature, that is models and measures that provide explicit information on students' self-efficacy for meeting writing's cognitive and linguistic, in addition to its self-regulatory demands (Bruning et al., 2013). In their efforts to rise to such a challenge, Bruning et al. (2013) utilized the work of Zimmerman and his

colleagues in an attempt to tie their measure to a model of writing that differentiates between the cognitive, language-based, and self-regulatory dimensions of writing.

In creating what became their writing-self-efficacy framework, Bruning et al. (2013) grounded their work on four assumptions: First, "writing is a complex cognitive act generating high demands on working memory" (p. 3). Second, writing is a process that develops slowly, over time, reflecting the complex procedures required at the cognitive, metacognitive, and linguistic levels. Third, based on the researchers own experiences and observation, writers glean meaningful impressions based on their own writing experiences, connecting to Schunk and Zimmerman's (1997) motivational aspect of self-regulation. Lastly, the researchers assumed that writers group their experiences with writing into "psychologically meaningful categories" (p. 4).

While the writing ideations and writing conventions were an important part of the studies, for the purposes of this review, the writing self-efficacy and writing self-regulation components are described most thoroughly. The authors were adamant that while writing ideations and an understanding of convention are important components of the writing process, self-regulatory skills are also required for successful writing outcomes. It is, as Bruning et al. (2013) stated, self-regulatory skills that help writers not only come up with ideas and strategies to guide them, but also provide them with the tools required to manage the affective aspects of writing, such as anxiety.

In the first study conducted by Bruning et al. (2013), they tested their model for writing self-efficacy with 697 middle school students. Older students were selected based on the assumption that such students were more likely to have well-formed

writing-related efficacy judgments. In order to gather information on the three components of their model, the researchers used the Writing Habits and Beliefs Survey (WHBS), which included a modified form of the Self-Efficacy for Writing Scale (SEWS). Within the scale, five items were designed to measure ideations, five conventions, and six writing self-regulation. The purpose of this first study was to see how well the items on the modified SEWS fit their model of self-efficacy of writing. Results showed meaningful variations by category, with middle school students on average feeling the most confident with writing conventions and the least confident with their capacity to manage the self-regulatory aspect of writing.

The purpose of the second study was to test the generalizability of the results from the first study and to capture further information on SEWS factors' relationships to other variables, such as liking writing, self-reported grades, and English Language Arts (ELA) class enrollment. In this study, the participants were 563 high school students. Like students in the first study, participants completed the WHBS with the SEWS component, but in addition to this measure, participants also completed the Liking Writing Scale (LWS), self-reported their ELA grades, and researchers were provided with scores from the Statewide Writing Assessment. Students were enrolled in one of four ELA classes, ranging from General English (GE) described as a class for students needing additional help toward reaching levels necessary for graduation to Advanced Placement Language and Composition.

Results from the second study, like those from the first, supported a multifactor (ideation, convention, & self-regulation) conceptualization of writing self-efficacy.

Closer examination of the results suggested a link between "confidence for managing writing's cognitive and metacognitive dimensions that has stronger ties to feelings about writing than confidence in one's ability to carry out writing conventions" (Bruning et al., 2013, p. 9). The researchers noted that the relationships between the writing beliefs measure and the SWA were modest and suggested the following reasons for these findings: first, about a month passed between administration of the beliefs measure and the SWA, and secondly, the SEWS measure is not genre-specific and did not pose questions about the performance in writing test situations.

As might be expected, writing self-efficacy beliefs varied by class placement, with those in the Advanced Placement (AP) class showing the highest self-efficacy for writing ideation, while those in the GE class showing the lowest self-efficacy for writing ideation. With regards to self-regulation, the AP students showed the highest confidence in this area. This seems logical if couched in terms of Bandura's (1986) stipulation that mastery experience is highly influential; students in advanced classes no doubt have more successes and opportunities to build on and foster positive feelings about writing than those in lower-track classes. Further, given their successes, it is likely they have well-developed self-regulatory strategies and that they use these effectively in their academic tasks.

Results reported by Bruning et al. (2013) hold promising potential for researchers interested in investigating writing from an ideation, convention, and self-regulatory aspect. Limitations in the research provided opportunities for others to examine similar aspects of writing that further include a planning (i.e. the forethought phase of

Zimmerman's model) and/or more genre specific. Additional studies could also be related to content area classes, as the adoption of Common Core curriculum has created a need for such studies. Despite the limitations, the study does provide an approach to looking at a single feature of writing, taking into account the preeminent role that self-regulation plays in all aspects of writing.

Self-Regulated Strategy Development

A large body of writing research has emerged since the late 1980s on SRSD, resulting in more than 25 studies showing the positive impact of SRSD on writing performance (Santangelo, Harris, & Graham, 2007). According to Graham and Harris (1996) and Harris et al. (2008), SRSD is an explicit, quality model of writing instruction that teaches students the strategies employed by skilled writers. Although SRSD was developed primarily to teach students strategies for completing academic tasks, during SRSD instruction, students are also taught the self-regulatory procedures necessary for engaging in the strategies (Graham, Harris, & Mason, 2005). Multiple studies have been conducted by researchers utilizing SRSD, which have indicated that SRSD improves writing quality, knowledge of writing, self-regulation skills, strategic behaviors, and motivation in diverse populations (Santangelo et al., 2007).

Graham et al. (2005) conducted a study to examine the effectiveness of an SRSD writing intervention designed to improve the writing performance, knowledge, and self-efficacy of 86 struggling third-graders in diverse, Washington D.C. classrooms. Based on prior studies that showed the effectiveness of SRSD in older, struggling writers (Berry & Mason, 2010; Graham & Harris; 1993; Graham & Perin, 2007a) and the relative lack

of data regarding the effectiveness of SRSD in younger children, Graham et al. (2005) also added a peer-support and self-efficacy component to the study. Given that younger writers typically fail to give little, if any attention to the planning (forethought phase) process in writing, instead skipping straight to composition (Flower & Hayes, 1981; Graham, 1990), the authors elected to focus much of their study and intervention on the planning or forethought aspect of the writing process. Since there is no assurance that SRSD will result in maintenance and generalization, despite these being goals of SRSD (Graham & Harris, 1993), a secondary purpose of the study was to see if peer-assistance would enhance SRSD, particularly with regards to its potential to assist with maintenance and generalization to uninstructed writing genres.

While the study is described in detail below, it is important to first explain how it relates to Zimmerman's model of self-regulation as the researchers do not base the entire study on this model. That being said, there are clear signs, both overt and covert, that the study contains many aspects found in Zimmerman's theory. Within the study, the general strategy included a means by which to plan and write a paper (Graham et al., 2005). The emphasis on planning by learning from models was a central focus of the study and aligns well with Zimmerman's forethought phase of cognitive processes. Helping students learn strategies to plan is an integral part of Zimmerman's model; a strategy and step less skilled or novice writers often fail to engage in. Within the SRSD instruction, students were also encouraged to use the metacognitive process of self-talk to assist with their writing. Such metacognitive processes of self-reflection are another central part of Zimmerman's model that help students reach the self-regulated stage. By

providing “mental models” (Graham et al., 2005, p. 209), students received what Zimmerman’s model would refer to as symbolic modeling, a key social or external component as students progress through the observation and emulation stages on the way to self-regulation.

Graham et al.’s (2005) examination of the impact of social support in the form of peers to facilitate metacognitive processes ties into Zimmerman’s model in that the goal of this tactic was to promote generalization, or in terms of the model, self-control and ultimately, self-regulation. Peer support was hypothesized to promote strategy use and help students ascertain how effectively they were using the strategies and/or if they needed to modify their strategy uses. This connects to Zimmerman’s model as students were assisting one another in becoming aware of metacognitive processes that could help them learn to become adaptive. It might also be argued that this social feedback situation was a means by which to encourage motivation, an integral part of Zimmerman’s model.

By nature SRSD instruction involves a modeling component. Due to the intense scaffolding inherent is such instruction, students receive the external or social component Zimmerman refers to within his observational stage. Novice learners may require more time within this stage and further benefit from the explicit nature of SRSD instruction as the instruction encourages a more process oriented view of writing. Graham et al. (2005) also addressed self-efficacy in the study, though they noted that studies on SRSD and self-efficacy have had mixed results. By addressing self-efficacy and attempting to increase students’ levels of self-efficacy, a key component of Zimmerman’s model, motivation, was acknowledged by making students’ gains evident and having them track

their growth as strategies were applied. Per Schunk and Zimmerman (1997), self-efficacy theory is primarily enhanced via performance accomplishments and self-observations. While findings indicated no difference on participant self-efficacy in writing following the SRSD instruction, it should be mentioned that students had positive perceptions of their abilities to plan and write essays (self-efficacy) before and after instruction, despite their clear struggling status with the subject matter. Reasons for this may include a tendency of younger writers to be less able to judge their own capabilities accurately (Gaskill & Murphy; 2004; Schunk et al., 2008) and the inclination of students with learning disabilities to overestimate their academic abilities (Klassen, 2006).

While the self-efficacy results following the SRSD instruction may have been disappointing, other motivational benefits of the study were noted. The peer support component of the SRSD intervention provided students with the opportunity to reflect on their experiences as they went through the process. Self-refection is the third phase of Zimmerman's model of self-regulation. According to Schunk and Zimmerman (1997), this is also an essential part of self-efficacy theory as it helps students learn information about themselves that is important in shaping self-beliefs about competence.

It was encouraging to note that following the SRSD instruction, students did exhibit improved metacognitive processes in their abilities to write superior and longer papers in two unstructured genres than students who had not received the instruction. Furthermore, these students took more time with their writing. From these findings, it is apparent that the SRSD impacted students' self-regulatory abilities in a positive way, as

they were able to adapt and generalize the strategies they had been taught on novel assignments, that is move into the self-regulated level of self-regulatory development.

The SRSD instructional program designed by Graham et al. (2005) was grounded in an understanding that learning in any domain is a complex process dependent *upon* the learner's ability to adjust strategic knowledge, content knowledge, and motivation as the demands of the subject-matter changes and increases in complexity (Alexander, Graham, & Harris, 1998). SRSD instruction lends itself well to this proposition since it focuses on a combination of strategy, skill, self-regulatory instruction, and thus indirectly, motivation; four critical components for success in writing. According to Schunk and Zimmerman (2007b), self-regulatory practices of modeling, goal setting, self-reflection, and self-evaluation have the effect of increasing student knowledge about their capabilities in a given domain, as well as enhancing motivation.

The study, which was comprehensive, divided the 72 participants into three equal groups according to the type of instruction they would receive: SRSD, SRSD plus peer support, and Control. All participants were given a pretest for writing stories, persuasive essays, personal narrative essays, and informative essays. Measures collected with regards to the essays included time spent on writing essays, number of words, and compositional quality using a holistic grading scale. Participants were also administered a measure of self-efficacy prior to the onset of instruction. While the SRSD instruction only addressed story writing and persuasive essays, posttest information was collected to provide information on generalization or transfer of skills. Participants' self-efficacy for

writing and planning a paper was also measured prior to and after instruction using a five item, 10-point self-efficacy scale designed by Graham and Harris (1993).

Instruction was provided by trained graduate students majoring in education over a five month period. Instructors taught participants strategies for writing stories and persuasive essays embedded within a more general self-regulatory strategy for planning and writing an essay. Instructors emphasized the importance of cognitive process of planning, a major goal of the study. In addition, students were taught about the parts of stories and persuasive essays, and made aware of the importance of using interesting words in quality writing; that is they were provided with the knowledge they would need to successfully execute the strategies they were being taught. In terms of self-regulatory information, students were discouraged from writing without a plan and instructed on the roles of planning, self-talk, goal setting, and monitoring performance as ways of facilitating performance. All in all, students in both SRSD groups received instruction designed to facilitate independent writing in two specific genres with the hope of generalization to other genres and maintenance. Key components of SRSD were utilized, including, but not limited to explicit instruction, scaffolding, guided practice, and independent practice. In addition, the added dimension of a peer-support component was provided to one of the SRSD groups. Graham et al. (2005) hypothesized that since many of the students in the district were underperforming in writing, that the Writer's Workshop approach (Calkins, 1986) which was prevalent at the time was not effective, and that SRSD would have a stronger impact on struggling students' writing performance.

The findings of this study for the most part showed the positive effect of SRSD on struggling, third-grade writers in the Washington DC area (Graham et al., 2005). Given that following the SRSD instruction, students in both SRSD wrote stories and persuasive essays that were longer, more complete, and qualitatively better (Graham et al., 2005), this study implied the potential value that SRSD adds to the writing instruction of struggling young writers.

In an effort to investigate the affective responses of college students to feedback they received on their writing, a study was conducted by Ekholm, Zumbrunn, and Conklin (2015). Specifically, they tested the predictive mediational roles of self-efficacy beliefs and feedback perceptions on writing self-regulation aptitude. Some research has indicated that students who have positive perceptions regarding feedback about their writing are more self-efficacious than those who have negative perceptions (Caffarella & Barnett, 2000). Other research has shown that perceptions of feedback on student writing have been positively related to writing achievement (Mcgrath, Taylor, & Pychyl, 2011). The combination of such findings suggested how students perceive feedback related to their writing may have important implications for both student writing achievement and motivation.

Ekholm et al. (2015) explored student perceptions of the feedback they received on writing, and how such perceptions related to their writing self-efficacy and writing self-regulation aptitude. Writing self-efficacy refers to students' beliefs in their abilities to complete written assignments successfully and writing self-regulation aptitude refers to students' beliefs in their abilities to manage the writing process effectively and

strategically. The researchers framed their study around two main research questions: How do students perceive the feedback they receive on their writing? And to what extent do student writing feedback perceptions mediate the relationship between writing self-efficacy and writing self-regulation aptitude? Both questions tied into Zimmerman's model of self-regulation from an affective perspective. That is to say, the study was primarily interested in how students felt about the feedback, which in turn would likely impact future efforts with writing.

The study included 115, primarily female (n = 92) undergraduates enrolled in Education and English classes. Measures included the Self-Efficacy for Writing Scale (SEWS), the Writing Feedback Perceptions Scale, and the Writing Self-Regulation Aptitude Scale. Results from the first research question indicated that for the most part, participants felt relatively positive about classmate and instructor feedback, they had positive writing self-efficacy beliefs, and indicated frequent use of writing self-regulative behaviors. Results related to the second research question indicated positive correlations among writing self-efficacy, feedback perceptions, and self-regulation. These conclusions further supported Schunk and Zimmerman's (2007a) findings of positive correlations between writing self-efficacy and writing self-regulation and provided a clear connection between the affective dimension of Zimmerman's model of self-regulation and writing self-efficacy. These premises are further supported by Ekholm et al.'s (2015) findings that participants with more positive perceptions of feedback, or positive affective reactions, showed higher writing self-efficacy and writing self-regulation aptitude than participants with negative perceptions, or negative affective responses to feedback. In

summary, a positive affective response to writing feedback predicted a significant amount of variance, more so than the variance accounted for by self-efficacy beliefs.

The researchers suggested the findings of their study be used to encourage college instructors to provide students with the self-regulatory tools required to help them be successful writers. Peer models are suggested based on the work of Schunk and Zimmerman (2007a), as well as progress feedback based on the work of multiple researchers, including Cleary and Zimmerman (2004) and Schunk and Swartz (1993b). The authors concluded with a reminder that feedback has always, and will always be an integral component of education. That being said, they insisted that the ways in which students react to such feedback impacts subsequent behaviors and beliefs and are as such worthy of educator attention to insure the desired writing outcomes.

Years of research on writing and self-regulation have shown that attempting to separate the "writing" from the corresponding self-regulatory processes is not in the best interest of students. It is apparent from the six studies summarized above, that self-regulated learning processes make a positive contribution to writing instruction and writing outcomes. In their two studies, Schunk and Swartz (1993a, 1993b), showed the benefits of strategy instruction, modeling, goal setting, and feedback. Zimmerman and Kitsantas (2002) highlighted the positive influence of coping models and social feedback. Bruning et al. (2013) explored the benefits of strategy instruction for ideation, convention, and the self-regulatory processes of managing writing decisions and behavior. They further postulated that self-regulatory skills are essential for successful writing outcomes and found that that writing cognitive and metacognitive dimensions

have stronger ties to feelings about writing than confidence in one's ability with writing conventions. Finally, they provided confirmation that higher levels of writing mastery are predictive of higher writing self-efficacy and self-regulatory strategy use.

Graham et al. (2005) reaffirmed the benefits of SRSD instruction for struggling writers in their study that focused on the planning phase of writing. They further added a peer support component to the study, which facilitated reflection on strategy use among participants. The effectiveness of mental models was also demonstrated. Ekholm et al. (2015) examined the relations of self-efficacy toward writing and writing self-regulation aptitude and found benefits of feedback and the positive affective responses to feedback for writing self-efficacy and writing self-regulatory aptitude.

From the information presented above, it is apparent that gaps in the literature still exist. Future writing interventions should consider that it is not sufficient to assume that students will, by themselves, effectively make the transition from the observational level of self-regulation to the self-regulated level. It will be important for educators to realize, that just as students differ in levels of writing skills attained, so too do they differ with relation to where they are form a self-regulatory perspective (Schunk & Zimmerman, 2007a). Interventions which take this into account, by for example, having students work in groups according to where they are from a self-regulatory perspective with regards to writing, might be easier for teachers to implement and be more successful.

It was noted that no studies targeted writing higher level research papers, a genre which is particularly important in high school and the post-secondary setting. While there have been calls for disciplinary literacy in the wake of the Common Core

curriculum adoption by most states (Shanahan & Shanahan, 2014) and Bazerman (2008) posits that the cognitive practices involved in writing differ by genre and discipline, there is still a place for sound, basic writing instruction that includes a self-regulatory component to lay the foundation students require to write. Without such a foundation, it is unrealistic to think students will become effective discipline-specific writers. Interventions that include sound strategies for planning, organizing, and revising research papers should be the standard in schools. Such interventions should embed the teaching of self-regulatory strategies so that students come to understand exactly how and when to apply such strategies, for example through the use of modeling. SRSD instruction offers a valuable contribution to students at all levels, since all students benefit from enhanced self-regulatory skills. Interventions should also be tailored to specific populations.

Given the lack of interventions addressing the genre of writing a research paper, an intervention should be developed that teaches high school students how to write quality research papers from start (the forethought phase) to finish (the self-reflection phase). Furthermore, such an intervention should progress, in sequence, through the levels of self-regulatory development to allow students to generalize the strategies they learn across all disciplines in the curriculum and attend to affect, such as anxiety with writing. Such an intervention should target multiple skills, including: generating ideas, planning, strategy use, effective research, writing a thesis statement, proper format, how to cite sources, organization, structure, use of transitions, and revision. Furthermore, by teaching such skills using SRSD instruction, students will benefit from the likely positive

impacts of such instruction on their writing quality, as well as their self-regulatory strategy use, writing self-efficacy, and writing affect.

Writing Apprehension

Writing apprehension per se has received scant attention in the literature since Daly and Miller's (1975) study on the construct and its influence on writing competency. However, Bandura (1977, 1986, 1997) addressed the role of anxiety or apprehension. As he stated, a certain level of apprehension grounded in reality can be useful as it can help foster and develop positive coping skills that may enhance performance. On the other hand, extreme apprehension based on erroneous information can have devastating effects on overall psychological functioning (Bandura, 1986), and in the case of academic endeavors such as writing, it can lead to students shutting down, giving up, and avoiding classes, majors, or even careers they perceive will require substantial amounts of writing.

According to social cognitive theory, anxiety can play a positive role in motivating people to act (Bandura, 1986, 1997). In fact, Bandura (1997) wrote that "social cognitive theory posits an interactive but asymmetric relationship between beliefs of coping efficacy and anxiety arousal" (p. 152). He suggested that efficacy beliefs have the more powerful role in the relationship, with self-efficacy having a strong predictable relationship to anxiety, but anxiety having a weaker predictable relationship to self-efficacy. In the academic realm, anxiety plays an important role, and this is amplified as students progress from elementary to high school. Sources of children's anxiety include parents, teachers, peers, and self, all of which can result in heightened levels of anxiety across the curriculum, with certain domains being more of a source of anxiety for

individuals than others. Bandura (1997) noted that given the high stakes of academic performance, such anxiety is not unfounded. Students who fail to make certain grades in high school effectively eliminate certain post-secondary options. In fact, in some cases student performance may dictate academic trajectory as early as elementary school. Given the high stakes at hand, it seems that anxiety is likely to be experienced at some point in the academic life-course, and thus should be a focus of further study—particularly the connections of anxiety to outcomes and ways of helping students ameliorate and manage anxiety to prevent anxiety from becoming a roadblock to academic and later success.

One promising route is found in Bandura's (1986) social cognitive theory, specifically self-efficacy. While most of the work to date has focused on the domain of mathematics (Betz & Hackett, 1983; Krampen, 1988; Meece, Wigfield, & Eccles, 1990; Lopez & Lent, 1992), the theory is being applied to other academic domains, including, but not limited to writing (Daly & Miller, 1975; Faigley, Daly, & Witte, 1981; McCarthy, Meier, & Rinderer, 1985; Pajares & Valiante, 1997). The overall findings are that a low sense of self-efficacy leads to higher anxiety, thus efficacy pays a mediational role in the effects of anxiety (Bandura, 1997). That is to say, students with a strong sense of self-efficacy may be less likely to feel anxious. Additionally, students with a high sense of self-efficacy are able to perform at levels higher than would be expected when academic potential, as measured by intelligence testing, is considered in isolation. Further, it has been suggested that a low sense of self-efficacy is more likely to exacerbate anxiety in test conditions, a common situation in which today's students find themselves. While not

all anxiety can be connected to low efficacy as students with high efficacy may also suffer from anxiety, students with lower self-efficacy may suffer from anxiety more often and for different reasons; further studies examining the role of anxiety in writing performance must take this into account.

Some studies have failed to show that anxiety is directly linked to performance (Siegal, Galassi, & Ware, 1985; Pajares & Johnson, 1994, 1996; Pajares & Valiente, 2006), they have found that when academic anxiety correlates with academic outcomes, the relationship is typically marginalized if the influence of self-efficacy is removed (Pajares & Johnson, 1994, 1996; Pajares & Valiante, 2006). That is to say, that while it is important to address and study the role anxiety plays in academic tasks such as writing, it is primarily so for the purpose of understanding the domains in which students may need help in building self-efficacy through cognitive skill development, not by simply making the anxiety disappear through palliative procedures (Bandura, 1997). In other words, once anxiety or apprehension is discovered, the remedy may lie in addressing the skill-deficits that typically accompany such feelings, which in turn help promote positive feelings of self-efficacy.

As mentioned above, the research on anxiety or apprehension and writing has been limited. That being said it is worth examining what has been found, starting with the early contributions to the literature by Daly and Miller (1975) and following with the subsequent work that has been done, largely by Pajares and colleagues. Daly's (1978) initial work on writing apprehension and writing competence offers valuable insight into the powerful role apprehension can play in influencing the actions and outcomes of

university students. In a study of more than 3000, mostly freshmen students enrolled in a required, basic composition class at a large Midwestern university, Daly (1978) found that students he characterized as being high in writing apprehension performed significantly worse on tests than students identified as having low apprehension. For the purpose of his study, he defined writing apprehension as being "concerned with a person's general tendencies to approach or avoid situations perceived to demand writing accompanied by some amount of evaluation (Daly, 1978, p. 10). His methods, while not without limitations, sought to examine levels of writing apprehension, in addition to levels of writing competency. Ultimately he hypothesized that students with lower apprehension in writing would perform better on a test of writing skills.

Daly (1978) utilized an instrument created by Daly and Miller (1975) which was specifically designed to measure the level of writing apprehension felt by an individual as well as a questionnaire that addressed writing competence. In addition, a 68-item, multiple choice test of writing competency was administered; this test was created from tests designed to accompany the course textbook students would be using. The skills measured included for the most part grammar, mechanics, and larger elements involved in composition (Daly, 1978). It should be noted that this test did not assess higher-order skills such as topic development, ideas, and elaboration. Per analyses run by the author, all measures were deemed reliable. From the results of the writing apprehension instrument, Daly (1978) was able to categorize students into three groups, based on the level of apprehension indicated by the results; high, medium, and low. For the purpose of addressing his hypothesis, he compared the results to those obtained by the competency

test. Using a one-way analysis of variance with the high and low apprehension groups, Daly (1978) was able to surmise that those identified as having high apprehension in writing performed significantly poorer on the test of competence than those identified as having low apprehension. He further hypothesized that those identified as having moderate apprehension would fall somewhere between the highs and lows on the test of competence; this hypothesis was supported by statistical analysis.

While the experiment conducted by Daly and Miller (1975) is almost 40 years old, the results sparked some similar studies and had implications for future research. Daly and Miller (1975) examined the relationship between writing apprehension and message intensity in undergraduate students enrolled in a basic psychology summer class at a university in West Virginia. Their findings indicated that students who were highly anxious about writing wrote messages that were less intense, and that students who were less anxious about writing wrote messages that were higher in intensity. Based on Daly and Miller's (1975) definition of message intensity, it might be worth examining the findings in relation to higher-level essays written by students with high and low levels of intensity, since they believed their results indicated that students under increased levels of cognitive stress typically produce less intense written communication. It might be that anxiety levels related to writing differ by task and by student. For example, a student who enjoys creative writing might find writing a research paper arouses anxiety, but do not experience anxiety when writing a creative piece.

In 1981, Faigley, Daly, and Witte conducted a similar study to Daly and Miller's original 1975 study, but using essays in place of a test of writing competence. While not

all results of this study showed similar findings in the relationship between writing apprehension and writing performance, that is, those with higher levels of writing apprehension performed at an inferior level to those with lower levels of writing apprehension, most of the results were significant. The exception in this study was associated with essay type with no significance in performance found between high and low apprehensives in an argumentative essay. Further research is needed to examine the possible reasons for this beyond the authors' speculation that proximity of topic to person may impact levels of apprehension.

As the research continued to expand on the role anxiety plays in student writing, McCarthy et al. (1985) examined the role of self-evaluation beyond simple evaluation of individual pieces of writing that was common during the time period (Beach, 1976; Pianko, 1979; Putz, 1975) to include a component that considered the role students' assessments, or writing self-efficacy played in their writing (McCarthy et al., 1985). By assessing the writing of 137 freshmen enrolled in beginning writing classes at Southern Illinois University, the authors found a significant relationship between writers' beliefs in their writing abilities and the quality of their written work.

The study asked students participating in the study to write two in-class, expository essays, one at the beginning of the semester and one during final exams. In addition, participants were asked to fill out multiple questionnaires seeking to measure their beliefs in their abilities to demonstrate specific skills related to writing, anxiety, feelings about writing, and to gauge how they perceived their locus of control. Finally, an inventory was administered to evaluate whether participants engaged more in shallow

or deep thinking (McCarthy et al., 1985). Grounded in Bandura's (1977) self-efficacy theory, McCarthy et al. (1985) were through their study able to substantiate the postulated role self-efficacy plays in performance, including writing. While a limitation of this study included lack of detail on how the essays were evaluated much beyond the fact that four experienced readers of freshman essays "made an analytical rating" (p. 468) of student essays, the findings served to lay the groundwork for further research with more rigorous, or at least more substantiated analyses.

In an effort to provide more in-depth information about the psychological processes related to writing, McCarthy et al. (1985) had a secondary goal of looking at three other psychological variables Bandura (1977) had connected to self-efficacy. Included in these variables was anxiety, which Bandura has claimed is associated with self-efficacy and ultimately quality of performance. In addition, the authors examined locus of control or the beliefs participants held regarding their control over outcomes and actions, as well as cognitive processing of information or depth of processing. In two studies, they hypothesized: that students with higher efficacy would be better writers than their counterparts with low efficacy, that students who felt less anxious would be better writers, that students who believed their locus of control to be internal would be better writers, and finally that students with deep information processors would be better writers (McCarthy et al., 1985).

Results from the first study which involved 137 college freshmen enrolled in a beginning writing class showed that only strength of efficacy was significant in a step-wise regression analyses and that students with a higher sense of efficacy produced

higher quality essays. However, in the second experiment conducted a semester later with 60 students, results showed that strength of efficacy and anxiety were significantly related to writing performance at the pretest, with only efficacy being significant at the posttest (McCarthy et al., 1985). Overall, their study showed that students with a stronger sense of efficacy were better writers and that students with lower anxiety were better writers (McCarthy et al., 1985).

While this study lends credence to Bandura's (1977) proposition of the role of self-efficacy as not only a powerful agentic force, but also a mediator between the individual and other psychological processes such as anxiety, it does not answer questions about the relationship of anxiety to self-efficacy in students who inaccurately assess their writing ability. The authors themselves posed the question, asking whether anxiety is lessened in students who overestimate their ability and called for expanding the range of questions used to measure student beliefs in writing self-efficacy to include more questions about the composing process (McCarthy et al., 1985). This study suggested the possibility that anxiety may contribute to student writing outcomes and that self-efficacy may play a role in ameliorating anxiety; future studies should examine both constructs in younger students at the grade-school level and across diverse writing tasks.

The construct of writing apprehension appeared again in a 2001 study conducted by Pajares and Valiante (1997) and later in a study by Martinez, Kock, and Cass (2011). In both studies, the word 'anxiety' either complemented or replaced the word 'apprehension'; however the constructs appear to be almost identical in nature. In addition, both of these studies, like McCarthy et al. (1985) included the construct of self-

efficacy into the mix, resulting in analyses that showed the relationship between the two constructs and lending further credence to Bandura's (1997) claims that self-efficacy plays a mediational role in the effects of anxiety or apprehension. These results further implied that anxiety might be lower in people with higher self-efficacy, since self-efficacy is posited to play a mediating role, and thus may ameliorate feelings of anxiety.

With the intention of testing the hypothesized mediational and predictive role of writing self-efficacy in fifth graders, Pajares and Valiante (1997) conducted a study that sought to examine whether or not self-efficacy made an independent contribution to the quality of essays when two other factors, apprehension and perceived usefulness were controlled for. Their study included 218 fifth graders in three schools. All aspects of the study were conducted identically at the different sites where the students completed instruments designed to measure self-efficacy, perceived usefulness, and apprehension.

In order to test the hypothesis that self-efficacy makes an independent contribution to writing performance, students were asked to write an essay titled "My Perfect Day," which was subsequently scored by three qualified individuals. The authors reported that all measurement instruments were reliable based on statistical testing and conducted tests of inter-rater reliability among the scorers of the essays. Causal suggestions were inferred using path analysis to examine the direct and indirect affects between self-efficacy, apprehension, and perceived usefulness and as found by McCarthy et al. (1985), Pajares and Valiante (1997) found that self-efficacy made an independent contribution to the prediction of writing performance. They further found that neither writing apprehension nor perceived usefulness of writing had a direct effect on writing

performance, and thus concluded that the study supported Bandura's (1986, 1997) claim that self-efficacy beliefs are mediators of apprehension and perceived usefulness.

Pajares and Valiante (1997) went further than Daly (1978), Daly and Miller (1975), Faigley et al. (1981), and McCarthy et al. (1985), and in addition considered prior achievement and sex differences. They found that prior achievement was an important source of self-efficacy, which confirmed the role social cognitive theory ascribes to prior experience or mastery experience as a source of self-efficacy (Bandura, 1986, 1997). The study found that sex had no direct effect on performance, but that it did have direct effects on perceived usefulness, apprehension, and self-efficacy (Pajares & Valiante, 1997).

More precisely, results showed that girls had reported lower apprehension, greater self-efficacy, and perceived writing to be more useful than boys. While causal effects cannot be concluded due to the correlational design of this study, the effects made the role that self-efficacy plays in mediating apprehension and writing performance salient and encouraged further study. Causal effects may be further authenticated by the tenets of social cognitive theory and the similar findings in multiple other studies (McCarthy et al., 1985; Pajares & Johnson, 1994; Pajares & Johnson, 1996; Schunk and Swartz, 1993a, 1993b; Shell, Murphy, Bruning, 1989).

In addition to adding new dimensions to the study of writing apprehension and self-efficacy, Pajares and Valiante (1997) made recommendations that practitioners who teach writing specifically address writing self-efficacy in addition to writing skills, since they found that self-efficacy held the greatest predictive power in writing performance.

Such attention should also help to ameliorate anxiety students feel which can be a source of emotional and physiological challenge.

The final study related to writing apprehension discussed in this literature review was conducted by the Scholars Alliance for Learning and Teaching (Martinez et al., 2011). This study, like many of the others (Daly, 1978, Daly & Miller, 1975; McCarthy et al., 1985), used a sample of college students to examine the role anxiety played in writing. Martinez et al. (2011) also examined the predictive role of writing self-efficacy in addition to writing anxiety. The authors tested six hypotheses, of which three were relevant to this current review of the literature and addressed specifically writing anxiety and/or writing self-efficacy.

Participants in the study included 127 college students at a college on the U.S. Mexico border in southwestern Texas, the majority of which, were female (n = 97) and 90% of whom were Latino(a). The sample included students from all four years of college with a mean age of 24 and participants had a mean GPA of 3.15. Students were enrolled in various classes across multiple disciplines and were asked to complete surveys which asked questions about the following: demographics, academic information, course load, the classes they were taking, how many required writing, number of short essays they were expected to write per semester, and writing center use. Participants were also asked to respond to question-statements to gauge the factors of writing anxiety, leisure writing, and writing self-efficacy. Surveys and answers to question-statements were administered once at the beginning of the semester as a pre-assessment measure and a post-assessment survey was administered at the end of the

semester to ascertain if attitudes about writing had changed over the course of the semester (Martinez et al., 2011).

Unlike the prior studies mentioned above, Martinez et al. (2011) did not look at how writing anxiety and writing self-efficacy might impact writing performance, but considered instead factors that predicted these constructs. They found that students with higher grade point averages had lower writing anxiety, that is, there was a negative correlation, females had significantly more writing anxiety, and that writing anxiety had a significant and negative relationship with writing self-efficacy, that is, higher writing anxiety indicated lower writing self-efficacy (Martinez et al., 2011). The results of this study further substantiated the role that anxiety plays in writing and supports Bandura's (1997) claim that instructors should attend to factors beyond skills in an effort to boost self-efficacy, which in turn will reduce anxiety and enhance writing performance. Pajares and Johnson (1994) and Pajares (2003) further suggested that by increasing student writing self-efficacy, student writing anxiety or apprehension could be reduced.

The findings of the studies discussed further warrant consideration alongside Bandura's (1977, 1986, 1997) self-efficacy construct. Soon after Daly's (1978) work on writing apprehension which suggested "low apprehensives would perform significantly better on a comprehensive test of writing skills than high apprehensives" (Daly, 1978, p. 11), Bandura began to develop a theory which positioned anxiety as a by-product of self-efficacy. This connection may be taken further when one considers that one of the four main sources of self-efficacy beliefs per Bandura's social cognitive theory is physiological reaction; anxiety may trigger physiological responses, thus impact self-

efficacy (Bandura, 1977, 1986, 1997). Given Daly's (1978) and Martinez et al.'s (2011) assertion that writing apprehension may be a factor in academic and occupational choices, and the importance of writing in school and beyond, the topic is worthy of deeper analysis and further investigation.

Dating back to Daly's (1978) original study on writing apprehension, the literature has consistently shown the importance of anxiety in the domain of academic writing. In his continued research alone and with other colleagues, a connection was repeatedly revealed between levels of writing apprehension and the quality of writing (Daly, 1978; Daly & Miller, 1975; Faigley et al., 1981). Later, as self-efficacy was added to the mix, it became apparent that self-efficacy is an effective mediator of not only writing apprehension/anxiety (McCarthy et al., 1985), but also of perceived usefulness (Pajares & Valiente, 1997).

The literature on apprehension/anxiety in writing supports Bandura's (1977, 1997) contention regarding the importance of self-efficacy as a construct in the academic sphere of functioning. As a mediator for anxiety and perceived usefulness of writing, educators may find utility in addressing self-efficacy in addition to the writing skills required to become a proficient writer. If the goal of a writing curriculum is to enhance writing performance, it logically follows that the research should be used towards this pursuit. As recently as 2011, Martinez et al. reconfirmed the role anxiety plays in writing and the relationship between writing self-efficacy and anxiety; this further substantiated the call for additional research on the topic.

Goals

The power of goal setting has been studied in depth in the laboratory setting and the corporate world, primarily by the industrial psychologists Locke and Latham (1990, 2002, 2006). Based on Ryan's (1970) groundbreaking work on the role of internal properties on motivation, Locke and Latham (2002, 2006) developed a comprehensive goal setting theory that could be applied to various business contexts around the world. Their findings on the relationship between goals and performance have relevant applications in school settings, such as in reading, writing, and math across all grade levels (Pintrich & de Groot, 1990; Schunk; 1990, 2003; Zimmerman et al., 1992). Students who set goals for themselves may find it easier to progress through assignments, particularly those which comprise multiple, complex parts and have extended deadlines.

According to Locke and Latham (2002), in order for goals to have an optimal effect on performance, they must meet certain criteria. In their studies, which specifically examined the relationship between concrete performance goals and levels of task performance in the workplace, they found that, for the most part, the most effort was expended when goals set were moderately difficult and that the least effort was expended when goals were either too easy or too challenging (Locke & Latham, 1990, 2002, 2006). They additionally found that goals that were specific or concrete were more motivating than more generic goals, such as "I know you can do it." This was further substantiated by Schunk and Swartz (1993a), who found that progress feedback enhanced strategy instruction and built self-efficacy in fourth- and fifth-grade student writing performance. The implications of Locke and Latham's (1990, 2002, 2006) work and studies such as

those done by Schunk and Swartz (1993a), suggest that generic goals such as “just do your best” are too ambiguous by nature and may prevent students from understanding what is expected of them, and thus be demotivating.

Proximity of goals was also identified as an important defining characteristic in goal effectiveness, with short-term goals being more motivational than more long-term goals (Locke & Latham, 1990, 2002, 2006). Short term or more proximal goals were also found to have the advantage of providing automatic feedback upon completion to people who set goals, thus creating the opportunity to set and achieve further, perhaps more distal, or demanding goals. It is possible that younger children are less capable of seeing far into the future and thus comprehending the value of more long-term goals is more challenging. It seems reasonable that adolescents may also fall into this category and would likely benefit more from setting a series of short-term goals designed to reach a more long-term goal as opposed to setting a single or few long-term goals. For example, assigning comprehensive research papers to adolescents may meet with more success if the task was broken up into several stages, or short-term goals such as a thesis statement, outline, first body paragraph, and other parts of the process, versus assigning a single due date at some point far in the future.

Though on their own, goals do not increase motivation (Schunk, 2003), according to Locke and Latham (1990, 2002, 2006) goals have properties and mechanisms that help propel people to act. Initially, goals help direct and sustain attention toward goal-relevant actions and away from activities which may detract from attaining a goal. Furthermore, goals promote energy, with higher goals promoting more energy and lower goals

promoting less energy. As tasks become increasingly difficult, goals help individuals persist, rather than give up, and goals effect action indirectly in that they promote the use of relevant knowledge and/or strategies (Locke & Latham, 1990, 2002, 2006; Schunk, 2003). It is easy to see how appropriate goal setting could be useful in the classroom setting; however it should also be noted that pre-requisite skills are required for goal attainment and setting goals. Setting unrealistic goals to complete tasks when necessary knowledge is not present would be counter-productive and likely undermine motivation.

When individuals are committed to goals they think are important, goals are more effective in promoting positive outcomes. Furthermore, goal commitment is necessary for goals to affect performance. In addition, people with higher levels of self-efficacy are more likely to be committed to goals and feel that they can attain them (Locke & Latham, 1990, 2002, 2006; Schunk, 2003; Schunk & Swartz, 1993a; Schunk & Swartz, 1993b). Given the role that self-efficacy plays in commitment to and achievement of goals, teachers would benefit from ensuring students have the knowledge required to set and meet goals, as well as the belief that they are capable of achieving goals. Self-efficacy becomes of increasing importance as tasks increase in demand and complexity, at which point the ability to use strategies becomes an important factor in reaching goals Locke & Latham, 1990, 2002, 2006). Students, who know and self-regulate their use of strategies, may be more likely to set and attain goals than students who lack such knowledge.

Locke and Latham's (1990) goal setting theory complements Bandura's (1986) social cognitive theory on several levels, including the mediational role both theories attribute to self-efficacy. However, the central focus of each theory differs while still

offering compatible understandings. Bandura (1997) posited that people have the power to exert a substantial amount of control over their lives through purposeful thought and that this includes the ability to select their own goals. Goal setting theory also acknowledges the importance of conscious goals, but goes further in the analysis of the goals themselves (Locke & Latham, 1990, 2002, 2006).

Locke and Latham's (2002, 2006) findings on the value of goals in the workplace have application for the classroom setting, and some researchers have examined the role of goals on student outcomes (Page-Voth, & Graham, 1999; Schunk, 2003; Schunk & Swartz, 1993a, 1993b; Zimmerman et al., 1992). It is easier to use skills and knowledge already held by individuals to set and reach goals than it is to teach new knowledge and skills for the purpose of reaching goals, although goals can also involve learning, referred to as learning goals. For this reason, the value of goals as a motivational construct may be more powerful in the workplace than school setting, and additional research should help clarify this further. Correspondingly, an important area of research has become the value and utility of learning versus performance goals (Schunk et al., 2008) and specifically their application in the classroom setting.

In a study conducted to explore the value of goal setting to the writing process, Page-Voth and Graham (1999) hypothesized that goal setting would have a positive impact on the writing of seventh and eighth-grade students with writing difficulties because of the directional function goals serve. They based their study on prior research that had showed that skilled writers set goals for themselves and that writing is by nature a goal-directed process. This study conducted in 1999 included 30 seventh and eighth-

grade students, all of whom had been previously identified as having writing and learning difficulties and who received learning disability support services. All participants were delayed by at least two years in writing, two and half years in reading, and one year in math. While the majority of the students were Black (n = 18), this sample was representative of the school district they attended; in addition 42% of participants received free or reduced price lunch. Students were randomly assigned to three groups; goal setting, goal plus strategy and a control group. After a pretest was administered, participants were asked to write three essays on topics researchers believed were likely to interesting to participants, each responding to a different goal, with the exception of the control group which was given no goals or strategies.

Initial findings from the study showed no differences worth noting in the length, quality, or otherwise of the pretest essay across the three groups. Findings from the study indicated that the specific goals, which included providing support and refuting counterarguments were helpful to students, in that such goals provided a supplemental level of support and structure about what was expected. Furthermore, such goals provided a source of direct feedback on progress, which enhanced motivation in students. Ultimately, the students in the study who were assigned goals had better writing outcomes, provided more details in their essays, and wrote longer essays that contained more relevant elements. Interestingly, results of the study failed to show an improvement in the efficacy of the participants, however this may due to the fact that the study was conducted over a short period of time and/or that it has been found that students with learning disabilities often over-estimate their abilities with regards to academic skills to

begin with (Klassen, 2006). Results of this study show that as in the work place (Locke & Latham, 1990, 2002, 2006), in school, goals can be beneficial to performance outcomes.

Results further confirmed Bandura's (1986, 1997) premise that goals serve to enhance the cognitive and affective reactions to tasks, in this case writing an essay, because such goals serve to make clear and specific what is required for success. While this study suggested the practical value of incorporating goals into the writing process for students with learning difficulties, by extension it seems logical that goals would enhance the writing of all students at all levels and of all abilities, and that all writers should be taught the value of goals rather than assuming that all competent writers set goals. Their study further backed up Locke and Latham's (1990, 2002, 2006) premise that specific goals are more effective than general goals because goal specificity helped students know exactly what they were aiming for versus more abstract ideas. By and large, specific goals better allow individuals to measure and gauge progress, which in turn leads to enhanced efficacy and motivation.

Zimmerman et al. (1992) examined the causal role of academic goal setting and student self-efficacy in tenth-grade students enrolled in a social studies course. Fifty boys and 52 girls who attended two schools in a lower middle-class neighborhood in a large Eastern city participated in the study. Social studies was the class selected to conduct the study, since, unlike its math and English counterparts for example, it was required of all students and not subject to formal tracking. The students in the study were diverse: 34% Black, 24% White, 23% Hispanic, 17% Asian and 2% unknown as reported

by a demographic survey. Given the course and demographic make-up of the participants, Zimmerman et al. (1992) felt the sample to be sufficiently representative of the students attending the high schools at which the study was conducted.

In order to measure perceived self-efficacy, two subscales from *The Children's Multidimensional Self-Efficacy Scales* (Bandura, 1989b, as cited in Zimmerman et al., 1992) were used; one for self-efficacy or self-regulated learning and the other for self-efficacy for academic achievement. A variation of rating scales developed by Locke and Bryan (1968) were utilized to ascertain the grade goals of both students and parents. All information (demographic, self-efficacy, and goals) was captured in a single questionnaire, in which anonymity was assured through the use of identification numbers in lieu of names.

Unlike Page-Voth and Graham's (1999) later study, this study sought to examine how prior performance and perceived self-efficacy beliefs influenced the goals, specifically related to grades, students would set for themselves, not how goals setting promoted and sustained motivation in a specific task. Their findings confirmed both Locke and Latham's (1990, 2002, 2006) and Bandura's (1986, 1997) premise that students with higher self-efficacy set higher goals and Bandura's and Cervone's (1983) premise that goals promote self-monitoring and self-judgments about performance outcomes.

The findings of the Zimmerman et al. (1992) study suggested a predictive relationship between perceived self-efficacy and final grade in the social studies class, as well as personal grade-goals. More specifically, statistical analysis indicated that student

perceived self-efficacy for academic achievement and student goals accounted for 31% of the variance in actual grades obtained. While much of the variance could not be accounted for, Zimmerman et al. (1992) indicated their confidence that the rest of the social cognitive theory model would offer additional explanatory power and thus encouraged subsequent research to explore such a claim. An interesting finding in the study was that parents tended to set higher goals for their children than the students did themselves. Given the finding of the connection between self-efficacy and goal setting, it is important that this relationship be considered when working with students who base their goals largely on their own beliefs about their capabilities, whether accurate, or not.

Setting goals can make an important contribution to motivation in the academic arena. However, it is critical to understand that it is the properties of the goals, not the goals themselves that have the potential to be motivating. More specifically the properties of specificity, proximity, and difficulty help define a goal's usefulness in motivating students to act (Schunk, 2003). Goal setting and achievement are closely related to self-efficacy and an understanding of this has the potential to enhance classroom instruction across multiple domains. Efforts to boost student self-efficacy using strategies that include goal setting will help promote student achievement.

Following in the footsteps of the groundbreaking work on the power of goal setting in the workplace by Locke and Latham (1990), it has become widely accepted that goal setting offers a formidable force in the school setting (Page-Voth & Graham, 1999; Pintrich & de Groot, 1990; Schunk, 1990, 2003; Schunk et al., 2008; Zimmerman et al., 1992). Page-Voth and Graham (1999) established that setting goals improved the writing

outcomes of students with documented academic difficulties in the same way that setting goals had been shown to be a strategy that skilled writers use. Zimmerman et al. (1992) established that for participants in their study, prior performance and self-efficacy were important factors for the characteristics of future goals they set for themselves. Schunk (2003) acknowledged that while goals themselves cannot create motivation, the properties of goals have the potential to unleash energy that in turn sets in motion a chain of events—the byproduct of which is enhanced self-efficacy and motivation.

All in all, since goals have the potential to increase cognitive and affective reactions to academic outcomes due to the characteristic of making specific what is required for success (Bandura, 1986, 1997), they offer the potential to help students in multiple academic spheres, not only in terms of improved performance, but also because of the inherent properties goals have to promote mastery performance and a sense of accomplishment.

Strategy Use

Far too many students drop out of high school prior to obtaining a high school diploma. While the reasons for high school dropout are multiple and complex, in some cases, a reason lower achieving students drop out may be an inability to effectively utilize academic strategies. As students progress though school, the demands of the curriculum increase, while simultaneously direct contact with teachers decreases (Hughes, Maccini, & Gagnon, 2003). For some students, this is a recipe for disaster—resulting in poor performance, low self-efficacy, and failure to complete high school. In the absence of effective writing strategies, students may resort to basic coping strategies, such as just

writing haphazardly or not writing at all, which ultimately limits their ability to communicate effectively through writing or be successful in classes that have a writing component (Vallecorsa, Ledford, & Parnell, 1991). In an environment where writing is essential for academic success and students likely receive minimal writing instruction during their time in school (Applebee & Langer, 2013), such students may experience repeated failure, resulting in low self-esteem, diminishing self-efficacy, and poor academic outcomes. The use of effective strategies in writing instruction may provide a means by which to bolster both self-efficacy and academic performance in writing, and thus warrants significant attention.

The use of multifaceted approaches to writing instruction has proven effective with a variety of students (Graham & Perin, 2007a; Mason, 2013). The main assumption of strategy instruction in writing is that is possible to teach struggling writers the conscious, cognitive processes proficient writers use as they develop quality essays (MacArthur & Philippakos, 2013). For example, prior to composing, good writers engage in planning, set goals, and use knowledge they have specific to a writing task to organize and ultimately generate essays. Proficient writers have an understanding that tasks may be specific to genre and audience and adapt accordingly in order to organize and generate quality essays (Hayes & Flower, 1980), while struggling writers might be oblivious to this fact, which reduces the chances of their producing a quality written product. Accordingly, strategy instruction aims to make struggling writers cognitively aware of that which proficient writers do without much deliberate forethought. For example, strategies involving planning would encourage students to start by analyzing a

writing task for purpose and audience and those involving revision would prompt writers to address aspects specific to the genre and/or mechanics of writing (MacArthur & Philippakos, 2013). Such strategies have the potential to help struggling writers impose outside structure on their writing; structure which they inherently lack. Struggling writers may benefit from structure to help offset gaps in knowledge, gaps often the result of a failure of educators to address and teach writing in schools (Applebee & Langer, 2013).

In addition to using strategies for writing, proficient writers use self-regulatory strategies that they may or may not be consciously aware of to guide them through the complex process of writing (Hidi & Boscolo, 2006). Quality writing involves a combination of requisite skills, combined with self-regulatory processes such as goal setting, self-monitoring, self-evaluation, and task management (Harris et al., 2008; Schunk & Zimmerman, 2007a). Good writers are able to simultaneously utilize their knowledge and skills about the craft of writing, along with a range of strategies to manage every step in the writing process, from planning to drafting to revising. It is this combination of writing skills and strategy execution that sets proficient and struggling writers apart and there are significant differences in the strategies used by proficient and struggling writers for planning and revising (MacArthur, 2011). Overall, writing strategies support self-regulation by giving students a systematic way to approach complex tasks and have been shown to result in higher quality writing (Graham & Perin, 2007a). Furthermore, strategies boost student confidence in writing, which has the potential to help students persist in writing tasks that become difficult and subsequently

less likely to engage in avoidance behaviors, the goals of which are to avoid writing tasks (Bandura, 1997; Hidi & Boscolo, 2006). It is for this reason that self-regulation is a key component to strategy instruction and has been emphasized in the work of Graham and Harris (1993), as well as more recently MacArthur (2011) and Harris et al. (2008).

Skilled writers must have the ability to utilize, activate, and implement multiple processes simultaneously as they produce quality written products (De La Paz & Graham, 2002) and as such, a certain degree of self-regulatory ability is required for optimal writing outcomes (Zimmerman & Risemberg, 1997). While skills and knowledge are implicitly required by good writers, strategy instruction has received increased attention over the past several years as a way to boost writing performance in students (Berry & Mason, 2012; De La Paz & Graham, 1997, 2002; Graham & Harris, 1993; Graham, Harris, & Mason, 2005; Graham & Perin, 2007a, 2007b; Harris et al., 2008). Strategy instruction involves intentionally and explicitly teaching strategies with the goal of improving student academic performance and outcomes. The ultimate goal of strategy instruction in writing is to provide students with strategies to be used independently during the writing process from planning, to drafting, to writing, revising and editing (Graham & Perin, 2007a; Harris et al., 2008).

To date, multiple studies across grade levels from elementary school to the community college have been conducted that indicate the positive results strategy use can have on student writing (Berry & Mason, 2010; De La Paz & Graham, 1997, 2002; Duijnhouwer, Prins, & Stokking, 2012; MacArthur & Philipakos, 2013; B. Tracy, Reid, & Graham, 2009; Troia & Graham, 2002). While much of the research thus far has

included students with learning disabilities (Paz & Graham, 1997, 2002; Graham & Perin, 2007a), there are studies which have included populations either solely of non-disabled students (Berry & Mason, 2010; Paz & Graham, 2002; Graham et al., 2005) or mixed groups. In their meta-analysis of studies on the effectiveness of self-regulated strategy development (SRSD) on adolescents, Graham and Perin (2007a) concluded that SRSD was effective in improving the writing skills of students involved in the studies they explored, with effect sizes for the most part exceeding .80. It is evident that SRSD has the potential to positively impact students with writing difficulties, the source of which, if due to lack of instruction, should be able to be ameliorated by instruction, including, though perhaps not limited, to SRSD instruction.

In a study that aimed to examine the effects of a writing program that included a strategy component on middle school students' writing outcomes, De La Paz and Graham (2002) conducted a six-week intervention on 58 seventh- and eighth-grade students. Paz and Graham (2002) designed and tested an instructional program that taught a writing strategy for planning, drafting, and revising, as well as the requisite sills required to utilize the strategy successfully. SRSD is an instructional model designed to foster growth in strategic behavior, knowledge, and motivation (Graham et al., 2005), thus is an all-encompassing approach well-suited to helping struggling writers.

Selection of a planning strategy was based on the fact that skilled writers and professional writers engage in high levels of planning and an understanding that younger writers often engage in little to no planning prior to writing essays (Graham, 1997). The goal of the planning strategy was to help students see the value in creating an initial plan,

as well as gain an understanding that planning is an ongoing procedure, subject to updates and revisions during the writing process. In addition to planning, the strategy students were taught emphasized the drafting process, specifically with regards to the use of transitions, sentence variety, interesting word choice, and the revision process.

The study was conducted at two middle schools in a suburban school district in the Southeastern United States. The schools selected exhibited similar demographic characteristics. One school had 504 students, of which 94% were White, 5% African American, and 1% Asian or Hispanic, and roughly 18% of the total student body received free or reduced-price lunch. The other school had 540 students, with indistinguishable percentages of White, African American, and Asian or Hispanic students, however at this school only 12% of students received free or reduced-price lunch (De La Paz & Graham, 2002). Five seventh- and eighth-grade Language Arts teachers were selected to participate in the study and ten Language Arts classes taught by these five teachers were randomly assigned to experimental or control groups—six to the experimental condition and four to the control condition. In total there were 58 student participants, 30 in the experimental group and 28 in the control group. Of these 58 participants, 38 were male and 20 were female; 42 of the participants were in the seventh grade, with the remaining 16 in the eighth grade. Due to the long-term, instructional nature of the study, the students were drawn from intact classes, thus the study was quasi-experimental in nature (De La Paz & Graham, 2002). Of note in this study, is that none of the participants received Special Education services and all participants had scored at average or above average in Reading and Language Arts according to the Comprehensive Tests of Basic

Skills. This is worth mentioning since most other studies involving SRSD have included struggling students with learning disabilities (Graham & Perin, 2007a) and thus have received special education services.

Since the teachers involved in the study were expected to prepare students for state testing, preceding the onset of the study, it was decided that the type of essay that would be targeted for the strategy and skills instruction would be expository, requiring explanation, persuasion, and perhaps, argument. At the start of the study, a pretest, which consisted of a 35-minute session to plan and write an essay was administered to all participants and statistical analyses revealed no significant differences between the experimental and control groups in planning, essay lengths, novel words, or overall quality. Following the pretest, participants in the experimental groups received in-depth instruction on how to independently use the PLAN and WRITE strategy using the six sequential steps as outlined by Graham and Harris (1993) and Harris et al. (2008).

Over six weeks, students were provided with explicit instruction on the PLAN and Write strategy. The PLAN part of the strategy is a brainstorming process that reminds students to *pay* attention the prompt, *list* main idea, *add* supporting ideas, and *number* ideas. Once brainstorming is completed, the WRITE component of the strategy encourages students to *work* from a plan to develop a thesis statement, *remember* goals, *include* transitions, *try* a variety of sentences, and to use *exciting* vocabulary (Paz & Graham, 2002). After students were introduced to the strategy, they received extensive modeling, followed by guided instruction, worked as a whole class to write an essay using the strategy, worked in small groups to write an essay using the strategy,

participated in whole-class discussions, and eventually wrote their own essays using the strategy with levels of support ranging from maximum to none as time went on. By the time the students were expected to use the strategy independently, they had received intense, explicit instruction, had multiple opportunities for practice, had peer and teacher feedback, made revisions, and were, as a consequence well prepared for independent use of the PLAN and WRITE strategy. This fact was confirmed by results of the posttest and the maintenance test of both the experimental and the control groups. The control group had received instruction within the traditional curriculum.

Following the six weeks of instruction, all students took a posttest, which like the pretest was a 35-minute session to plan and write an essay. One month later, another such test was administered to probe for short-term maintenance. Paz and Graham (2002) found that the students in the experimental group who had been taught the PLAN and WRITE strategy wrote essays that were longer, contained more mature vocabulary, and were qualitatively better than the essays written by students in the control group. Furthermore, such gains were observed one month later. Effect sizes ranged from 0.82 to 1.71 on the posttest and maintenance essays. Moreover, it was noted that while prior to the program 80% of the students did no planning prior to writing an essay, following the intervention, 97% of the students in the experimental group generated written plans.

This study reinforces the findings in the literature on SRSD and shows the potential implications of writing instructional programs that incorporate a strategy element within them. Furthermore, this study provides evidence that SRSD can be incorporated into regular classrooms and can serve all students in increasingly inclusive

classroom settings. While Paz and Graham (2002) acknowledged critics who charge that teaching such strategies for writing has the potential to threaten the latent writing creativity of students, it could be countered that such criticism is unwarranted given the NAEP scores mentioned above. Critics who state that rhetoric is not rule-governed thus writing should not be taught by rules are clearly overlooking the fact that students are given state-mandated tests based on rules and rubrics. As one ponders the value of explicit strategy instruction, it is important to keep in mind that SRSD based on Graham and Harris's (1993) work has proven to increase student knowledge of writing, increase the sophistication of student writing, and ultimately raise the quality of the writing of students who were taught to use such strategies.

While writing is critical for success in school, it is also an essential skill in the workplace (Graham & Perin, 2007b). In many professions, employees are expected to write memos, emails, and reports, and if writing was never mastered in school, this becomes problematic. While little research has been done on struggling writers who have dropped out of high school, given that one possible avenue for high school dropouts is obtaining a General Education Diploma (GED), which requires a writing component, Berry and Mason (2010) conducted a study examining the effects of SRSD on the writing of expository essays for adults with writing difficulties who were preparing for the GED. Citing the relatively small, but increasing body of literature on the effects of SRSD on the writing of postsecondary students and the meta-analysis conducted by Graham and Perin (2007a), Berry and Mason (2010) hypothesized that SRSD would have a positive effect on the participants in their study who had a history with struggling in writing and

dropping out of high school. They further hypothesized that the self-regulation aspect of SRSD would benefit individuals given its tendency to reinforce independent characteristics such as goal setting, self-instruction, self-reinforcement, and self-monitoring (Berry & Mason, 2010). All in all, it seems logical that strategies designed to foster both independence of skill use and self-regulatory ability would serve to bolster self-efficacy and thus performance.

Berry and Mason's (2010) study was a multiple-probe, multiple-baseline, across-subjects design that was used to evaluate four participants' writing before and following an intensive instructional intervention. The purpose of the study was to investigate the effectiveness of SRSD with postsecondary students with and without learning disabilities who expressed a desire to pass the written portion of the GED. Three questions guided the study, the first addressing the effectiveness of SRSD of the POW, TREE, and COPS strategies as means by which to bolster number of words in essays, essay parts, transition words, and descriptive words. The second question sought to gauge how beneficial the participants felt the strategies were in preparing them for the GED and in becoming better writers; the final question examined the maintenance of the skills and generalization to the GED exam and story writing. The researchers identified the independent variables as essay parts, transition words, descriptive words, and essay length—all variables that aligned with what is takes to score an adequate or passing essay on the GED (Berry & Mason, 2010).

The study was conducted in four phases starting with baseline, moving to instruction, then post-instruction, and ending with maintenance. These phases aligned

well with Paz's and Graham's (2002) pretest, instruction, posttest, and maintenance probe. Instruction was provided on-site at the location the participants attended the GED preparation classes in an alternate room. Most of the instruction was provided by the lead researcher on a one-on-one basis two to three times per week for 45 to 90 minutes until mastery was achieved in all six stages of SRSD. All instruction followed the recursive steps for SRSD as set out originally by Graham and Harris (1993) and more recently by Harris et al. (2008), beginning with strategy review and ending with independent ability to utilize strategies. Reasons for irregular weekly meetings and session length included the GED instructor's report that many students attended classes inconsistently.

This study was conducted in a small rural town in an Eastern state. Participants included four adults voluntarily attending free GED classes; two in their 20s and two in their 30s who had dropped out of high school for various reasons sometime between the eighth and 12th grades. Three of the participants were female and one was male. Of the four participants, two reported having received Special Education services for writing while attending public school. All participants were attending free GED preparation classes and were identified by the instructor as having substantial writing difficulties. Further confirmation of writing difficulties was acquired by administering the Test of Written Language (TOWL-3), on which all participants scored at least one standard deviation below the mean, placing them in the below average to low-average range in writing. During the pretest, one of the participants was unable to write a single, scorable sentence in the TOWL-3, two participants' scores ranked in the second percentile, and one participant, the only male scored in the 23rd percentile. Two of the participants had

previously failed the written portion of the GED. It is evident that all participants in this study were facing profound challenges with writing.

Instruction consisted specifically of three strategies that have a track record for improving student writing performance (Paz, 1999; Harris et al., 2008; Mason & Graham, 2008). The POW strategy is designed to lead students to *pick* an idea and pay attention to the prompt, *organize* ideas, and *write,* and say more. Within the organization part of the POW strategy, participants were taught to organize their ideas by developing *topic* sentences stating a belief, generating three *reasons* for the stated belief, *explaining* at least two of the reasons stated, and *ending* the essay with a conclusion. For the purpose of this study, Berry and Mason (2010) further encouraged participants to add a counter-arguments or additional explanations. The third part of the POW strategy was taught to be employed after implementation of the TREE strategy; *write* and say more provided participants the opportunity to provide additional information and details about topics.

The final strategy taught to improve writing outcomes was the revision strategy COPS. During this stage of strategy use, participants were encouraged to review their essays and make revisions as deemed necessary. COPS is designed to remind students to check for correct *capitalization,* ensure *organization* meets requirements set forth by TREE, check *punctuation,* and make sure each sentence makes *sense*. Following intensive instruction, generalization and maintenance were assessed via the TOWL-3 Form B and the essay portion of the GED. It is important to mention that imbedded within the SRSD instruction was explicit instruction on four procedures of self-

regulation: self-instruction, goal-setting, self-monitoring, and self-reinforcement. These self-regulatory processes are important components of SRSD strategies.

Findings of the study were positive, not only in tangible outcomes, but in terms of participants' enhanced self-beliefs about their abilities to write. Overall, all participants showed improvement in their abilities to write expository essays similar to those they could expect on the GED following work with the SRSD for POW, TREE and COPS. Subsequent to instruction, it was noted that essays written by participants were longer, more complete, better organized, and more focused. The most pronounced area of improvement observed in the participants' essays was organization as measured by essay parts and the use of transition words. Berry and Mason (2010) found that essays generated following instruction contained relevant topic sentences, appropriate reasons to support topic sentences, and concluding statements that reiterated the main point. All in all, the quality of the students' essays increased significantly following the strategy instruction, and all but one participant subsequently passed the writing portion of the GED. A likely explanation for this is that the male participant took an extended, ten week break from instruction to fulfill family farm obligations; it is worth noting that according to the initial TOWL-3 results, this participant had the strongest wring skills of the four participants prior to instruction, thus there is every reason to think that if he had continued with the instruction, uninterrupted, that he too would have passed.

While the tangible outcome of passing the written portion of the GED was the quantifiable goal the participants aspired to achieve, other positive outcomes for the participants resulted from the study. Following the completion of the study, all four

participants expressed that they felt increased levels of confidence in their abilities to write. Such feelings of increased confidence have the potential to impact future choices made by people as they progress not only in education, but in career choices (Bandura; 1986, 1997). Limitations of the study included the small sample size and the erratic attendance of the participants. However, given the overall success of the SRSD instructional program in spite of attendance problems, it is feasible that the effect is under-estimated. Berry and Mason (2010) cautioned instructors to pay close attention to students at the time when scaffolding is being removed and to intervene as appropriate to prevent permanent setbacks. This study has implications for all struggling writers, not just the most extreme. It seems appropriate that in a nation where large numbers of children, adolescents, and adults struggle with writing (Graham et al., 2005; Graham & Perin, 2007b; NCES, 2012), that strategies designed to ameliorate such struggles should be common place.

While attempting to help struggling, adolescent writers is imperative, Graham et al. (2005) stressed the importance of identifying effective instructional practices for the nation's young writers as they begin their journey with the writing process. Such action has the potential to reduce the number of struggling adolescent and adult writers. This proposition is further bolstered by claims that as children progress through school, addressing literacy problems becomes more complex and less successful (Slavin & Madden, 1989). With this in mind, a goal of writing instruction in the primary grades should be to eliminate failure and frustration in later grades and beyond.

Graham et al. (2005) conducted a study to examine the effectiveness of an instructional program designed to improve the writing performance, knowledge, and self-efficacy of struggling third-graders in diverse, Washington D.C. classrooms. Based on the prior studies that showed the effectiveness of SRSD in older, struggling writers (Berry & Mason, 2010; Graham & Harris; 1993; Graham & Perin, 2007a; Harris et al., 2008) and the relative lack of data regarding the effectiveness of SRSD in younger children, Graham et al. (2005) also added peer-support and self-efficacy components to the study. Given that younger writers typically fail to give little, if any attention to the planning process in writing, instead skipping straight to composition (Flower & Hayes, 1981; Graham, 1990; Kellogg, 1987), the authors elected to focus much of their study and intervention on the planning aspect of the writing process. Since there can be no assurance that SRSD will result in maintenance and generalization, despite these being goals of SRSD (Graham & Harris, 1993), a secondary purpose of the study was to see if peer-assistance could enhance SRSD, particularly with regards to its potential to assist with maintenance and generalization to uninstructed writing genres.

The instructional program designed by Graham et al. (2005) was grounded in an understanding that learning in any domain is a complex process dependent on the learner's ability to adjust strategic knowledge, content knowledge, and motivation as the demands of the subject-matter changes and increases in complexity (Alexander et al., 1998). SRSD instruction lends itself well to this proposition since it focuses on a combination of strategy, skill, self-regulatory instruction, and thus indirectly, motivation; four critical components for success in writing. According to Schunk and Zimmerman

(2007b) such self-regulatory practices of goal setting, self-reflection, and self-evaluation have the effect increasing student knowledge about capabilities in a given domain, as well as enhancing motivation.

After administering the TOWL-3 to 317 third-grade students from 12 classrooms in four schools in the urban Washington D.C. area, 86 students were identified as struggling. For the purposes of this study, struggling was defined as achieving a score on the TOWL-3 of a least 2/3 of a standard deviation below the mean, scoring at least 2/3 of a standard deviation below the mean on another well-known test of writing ability, and having teachers confirm student struggling status. The final number of students who participated in the study was 72, 44 boys and 28 girls, all of whom exhibited profound difficulties with writing. For 86% of the participants, English was their primary language, with the remaining 14% speaking Spanish and English. Seventy-five percent of the participants were Black, 14% White, 10% Hispanic, and 1% Asian; this racial make-up was consistent of the schools involved in the study, as well as the district as a whole. Like many of their counterparts in the district where the study was conducted, 67% of the participants received free or reduced-price lunch. Twenty of the participants were identified as having disabilities, learning disabled (n = 12), speech and language disabled (n = 4), Attention-Deficit Hyper Activity Disorder (n = 2), and emotionally disabled (n = 2).

The study, which was comprehensive, divided the 72 participants into 3 groups according to the type of instruction they would receive: SRSD (n = 24), SRSD plus peer support (n = 24), and Control (n = 24). All participants were given a pretest for writing

stories, persuasive essays, personal narrative essays, and informative essays. Measures collected with regards to the essays included time spent on writing essays, number of words, and compositional quality using a holistic grading scale. As recommended by Graham (1999), all essays were typed and corrected for spelling prior to scoring to prevent negative bias on writing quality. Participants were also administered a measure of self-efficacy prior to the onset of instruction. While instruction would only address story writing and persuasive essays, posttest information would be collected to provide information on generalization or transfer of skills. Participants' self-efficacy for writing was also measured prior and after instruction using a five item, 10-point self-efficacy scale designed by Graham and Harris (1993) to measure student efficacy for planning and writing a paper. The self-efficacy measure was administered according to suggested guidelines outlined by Bandura and Schunk (1981), thus was practiced and read aloud.

Instruction was provided by six, trained graduate students majoring in education and was administered three times a week for 20 minutes to pairs of students in the SRSD groups over a five month period. Instructors taught participants strategies for writing stories and persuasive essays embedded within a more general strategy for planning and writing an essay. Instructors emphasized the importance of planning, a major goal of the study. In addition, students were taught about the parts of stories and persuasive essays, and made aware of the importance of using interesting words in quality writing; that is they were provided with the knowledge they would need to successfully execute the strategies they were being taught. In terms of self-regulatory information, students were discouraged from writing without a plan and instructed on the roles of planning, self-talk,

goal setting, and monitoring performance as ways of facilitating performance. Students in both SRSD groups received instruction designed to facilitate independent writing in two specific genres with the hope of generalization to other genres and maintenance. Key components of SRSD were utilized, including, but not limited to explicit instruction, scaffolding, guided practice, and independent practice. In addition, the added dimension of a peer-support component was added to one of the SRSD groups. In this scenario students met in pairs to discuss their writing.

Based on the Writer's Workshop model (Calkins, 1986; Graves, 1983) that was prevalent in the district at the time, the students in the control group received instruction comprised of mini-lessons designed to take students from the planning to the publishing phases of the writing process. Graham et al. (2005) had hypothesized that since many of the students in the district were underperforming in writing, that this method was not effective and that SRSD would have a stronger impact on students' writing performance than the Writer's Workshop-based instruction. While the results of SRSD and self-efficacy have failed to be consistent (Graham, Harris, MacArthur, & Schwartz, 1991; Page-Voth & Graham, 1999), Graham et al. (2005) hypothesized and hoped that participants in their study would exhibit enhanced self-efficacy through SRSD's predisposition to promote confidence via its built-in mechanisms to show progress (Berry & Mason, 2010; Graham & Harris, 1993). Students, who feel that they are making progress toward a goal and that they are being successful in the incremental steps, are more likely to have an increased sense of self-confidence or self-efficacy.

The findings of this study did on the whole show the positive effect of SRSD on struggling, third-grade writers in the urban Washington D.C. area (Graham et al., 2005). Given the plethora of results, for the purposes of this literature review, the main findings with regards to the importance of strategy instruction are summarized below. First, it is noteworthy that students in both SRSD groups improved significantly on all measures in the instructed genres of story writing and persuasive essays; however, in terms of generalization and maintenance, the results were less significant. Second, for the most part, no statistical difference was observed between the two SRSD groups, with the exception of some minor transfer of skills to the uninstructed genres. Finally, no difference on participant self-efficacy in writing was observed, although it should be mentioned that the students had positive perceptions of their abilities to plan and write essays before and after instruction, despite their clear struggling status with the subject matter. Reasons for this may include a tendency of younger writers to be less able to judge their own capabilities accurately (Gaskill & Murphy; 2004; Schunk et al., 2008) and the inclination of students with disabilities to overestimate their academic abilities (Klassen, 2006).

Given that following the SRSD instruction, students in both SRSD wrote stories and persuasive essays that were longer, more complete, and qualitatively better (Graham et al., 2005), this study confirmed the potential value that SRSD can add to the writing instruction of struggling young writers. This can be further substantiated by the fact that according to the results of the study, the students in the SRSD groups were writing stories and persuasive essays that met the criteria for an average qualitative score compared to

their peers in their schools as a whole. This shows a significant improvement from the struggling status that was confirmed prior to the start of the study; an improvement that was not observed in the students in the control group.

According to the NCES (2011), 27% of students attending postsecondary institutions right out of high school attended community colleges. Given the open access policy of community colleges, many students who attend such institutions are not adequately prepared to meet the academic demands of college; this is further indicated by the fact that between 40% and 60% of students take developmental classes in reading, math, or writing, and of these, only a minority progress through the entire developmental track and earn college credit. Since developmental writing classes provide a ready-made group of struggling writers and not much research has been done on developmental writing classes, despite the large numbers of students who participate in them, MacArthur and Philippakos (2013) recently conducted a design research project which aimed to create and evaluate a curriculum based on self-regulated strategy instruction.

MacArthur and Philippakos (2013) utilized prior research on the effectiveness of strategy instruction with a self-regulatory component (Graham, 2006; Graham & Perin, 2007a) to design a curriculum for students in developmental writing classes at a community college that included strategies for planning, drafting, and revising essays. The curriculum further included a self-regulatory strategy that addressed task analysis, goal setting, strategy selection, progress monitoring, and reflection. The desired outcomes of the curriculum included improved writing skills, enhanced writing and self-

regulatory strategy knowledge, increased motivation and self-efficacy, and being prepared for the first year college composition course.

The study was conducted at a single community college on the East coast of the United States and included instructors and students from developmental writing courses. While the study was conducted at two developmental class levels, due to space constraints, only the results of the lower level classes were reported in the article. Specifically, the article described and reported the results of the first two rounds of the study which were implemented in the fall and spring of 2011. In total, three instructors participated; one male in round one and two additional females in round two. All teachers had education backgrounds and experience teaching developmental literacy courses at the community college level. Given the somewhat different goals of the two rounds, for simplicity's sake, each round will be described independently.

Round one served in some ways as a testing round, involving only the one male instructor and 10 students, four of whom dropped the class prior to the posttest phase of the study. However, given that the goals of round one were more of a trial run, and several modifications were made to the curriculum following the round, the data gathered were useful and worth reporting. All participants were given pretest measures on persuasive essays, which were scored by two raters using a 7-point scale for quality, content, organization, and conventions. The persuasive genre was selected due to its broad academic application (Nussbaum, Kardash, & Graham, 2005). In addition to a test of writing ability, participants completed a questionnaire to measure motivation for writing. The questionnaire contained four scales related to self-efficacy for writing,

achievement goal orientation for writing, beliefs about writing, and affect towards writing. The motivation scales were based on the prior theoretical research of Pajares and Valiante (2006) and White and Bruning (2005), and were adapted by the authors for students in the community college setting.

MacArthur and Philippakos (2013) stressed the iterative nature of their study based on the work of Gravemeijer and Cobb (2006, as cited in MacArthur and Philippakos, 2013), thus throughout round one, they gathered information via observations and interviews, in addition to their quantitative data to promote revision and change to their curriculum design. Results of round one indicated that nine of the ten students made significant gains in writing quality and conventions, with the remaining one student score remaining unchanged. Students' scores at posttest were similar to those in the higher class, which was a primary goal of the study. Despite the apparent positive effect of strategy instruction from a quantitative or score-perspective, the interview results of round one yielded mixed results, with few students being able to recall details of the planning and writing strategies, genre knowledge, and/or substantial information about conventions.

Based on the information accrued during and after round one, multiple changes were made to the curriculum prior to implementation of round two. Changes made were based on a combination of feedback from the instructor and participants, as well as information gathered during participant observations. By choosing design research with its iterative nature, MacArthur and Philippakos (2013) had the ability to acquire information and apply it within a study to make improvements to a writing curriculum.

Changes to the curriculum included enhancing review of knowledge and genres at beginning of instruction to address the weaknesses discovered in participant interviews and adding more support to the self-regulatory strategies. Examples of strategies selected to boost the self-regulatory process included those aimed at enhancing task management, maintenance of motivation, and writing strategies. Students were additionally asked to write journal entries focused on goals and strategies, which in turn were discussed in class. There were also modifications made to instruction in the process of critical evaluation from a strategy-perspective, peer review, editing, and the persuasive genre. Finally, professional development was extended in terms of scope and breadth, and instructor discomfort with modeling was addressed.

It was evident that by the time round two began that substantial revisions had been made to the curriculum, and that the instructors were better prepared to implement the curriculum as a whole. Results of round two reflected the curriculum improvements, and from pretest to posttest significant gains were observed in writing quality with a large effect size of 1.95. A large effect size was also evident in writing conventions = 1.18 (MacArthur & Philippakos, 2013). In addition to the impressive gains in writing achievement, unlike Graham et al. (2005) who saw no increase in self-efficacy in their study of struggling, third-grade writers, the current authors were able to show a significant increase in self-efficacy for writing as well as an increase in mastery motivation. Furthermore, results indicated that students' beliefs about the importance of substance over mechanics had increased. While participant interviews confirmed quantitative findings about self-efficacy and affect, such interviews also served to inform

researchers about continued participant weakness with genre knowledge. It was also revealed that only half of the participants had memorized all parts of the strategies (MacArthur & Philippakos, 2013). Despite these shortcomings, overall, the results of the curriculum were impressive and an improvement was observed from round one. Continued tweaking in the curriculum prior to the next round will hopefully further bolster results and effects.

MacArthur and Philippakos (2013) have shown that strategy instruction can be effective in improving the writing quality and enhancing the writing self-efficacy of students in developmental writing classes at a community college. A shortcoming of the study was that it was conducted at only one site. An additional shortcoming was the lack of a control group making it difficult to conclude that the self-regulated strategy instruction was responsible for the significant gains in students' writing quality and motivational affect. Future studies should aim to replicate the curriculum at other community colleges and incorporate control groups. Other studies could address the writing curriculum at other levels, such as high school. Given that MacArthur and Philippakos (2013) found it difficult to support self-regulatory strategies within the writing strategy component, and that students failed to take the journal-reflections on strategy use seriously, future studies should take these factors into consideration, adapt the curriculum accordingly, and factor in classroom management and motivation when conducting research.

It is apparent that strategy use is a powerful tool for struggling writers. While the meta-analysis compiled by Graham and Perin (2007a) had confirmed the overall

effectiveness of SRSD in adolescents, studies before, during, and since that meta-analysis continue to show the promise of SRSD for writers of all ages. Paz and Graham (2002) found SRSD to be effective with struggling seventh and eighth-grade students. Students in their study were taught the PLAN and WRITE strategies for planning, drafting, and writing essays, and following instruction, it was found that students wrote essays that were both longer and qualitatively better than their counterparts in a control group. Results further indicated that students were able to exhibit maintenance of these skills one month following instruction. Finally, the study revealed that while 80% of students exhibited some form of planning behavior prior to instruction, following the six week intervention, 97% of the students produced some form of written plan prior to writing. Other studies have further implicated the role strategy instruction should play in the writing instruction of struggling writers.

Berry and Mason (2010) and MacArthur and Philippakos (2013) recently conducted studies on slightly older struggling writers, and also found positive results following strategy instruction with their participants. While their participants included adolescents, they were not in the traditional K-12 system. The Berry and Mason (2010) study included students pursuing GEDs and the MacArthur and Philippakos (2013) study included students in developmental writing classes at a community college. Both studies yielded results showing the positive effects of strategy instruction on the quality of the participants' writing. In addition, these two studies showed the positive implications of strategy instruction on writing confidence and motivational affect, an aspect that has revealed mixed result in other studies.

While third graders are not traditionally thought of as adolescents, a study conducted by Graham et al. (2005) was included in this literature review due to the quality and detail of the study, as well as the fact that it included a peer-coaching and self-efficacy aspect. The results of their study confirmed the positive impact of strategy instruction on writing quality and knowledge. However, with regards to the impact of peer assistance, the results were mixed and the authors found no effect on self-efficacy. This study has replication potential with adolescents, who may be more realistic about their capabilities, and thus better able to participate in productive peer-support relationships.

All of the studies reviewed implied the need for further research on the topic of strategy instruction for struggling writers. Given the power that strategy use has yielded in many domains with struggling students, it would be interesting to see what strategy enhancement could do for proficient writers in helping them take their writing to the next level; participants in such studies could include writers in grade school all the way to writers in college or those working on doctoral dissertations.

Writing and Self-Efficacy

Self-efficacy has been shown to have an impact on student writers from elementary school to college, though there is less research on writing and self-efficacy than other subjects, such as math. Klassen's (2002) review examined the research on the role of self-efficacy beliefs in early adolescence. In his search, he attempted to locate studies conducted since 1977, the year Bandura published *Self-efficacy: Toward a unifying theory of behavioral change,* and the time when self-efficacy became a known

entity in the motivational literature. His search revealed that since 1977, 173 articles had been published on writing and self-efficacy, of which 40% of the articles were related to college students, 31% involved children in elementary school, 4% involved senior high school level students, and the remaining 2% were related to adults (Klassen, 2002). By the time Klassen published his review in 2002, the field was ready for additional research on adolescents in high school.

For the purposes of his review, only 16 of the 173 articles met the criteria of including adolescent subjects. Findings of Klassen's review provided support for Bandura's (1986, 1997) social cognitive theory in that of all motivational constructs assessed in the studies, self-efficacy was typically found to be the strongest predictor of writing outcomes (Klassen, 2002). His review also indicated a negative relationship between writing anxiety and writing self-efficacy; that is people with higher levels of anxiety had lower levels of self-efficacy and vice-versa. Klassen's (2002) review indicated a need for additional studies on the writing self-efficacy of adolescents. Furthermore, given that he could only locate one qualitative study, the need for studies that explore how students' beliefs about their writing ability develop and evolve are also needed.

Pajares and Valiante (1997) conducted a study to examine the influence of self-efficacy, writing apprehension, perceived usefulness of writing, and writing aptitude on writing an essay. Participants included 218 fifth graders, 115 girls and 103 boys from three elementary schools in the South and Southwest. The study was group administered during two class periods, the first of which was used to gather information from students

on their feelings about self-efficacy, the perceived usefulness of writing, and writing apprehension. The second class period was allotted for participants to write a 30-minute essay titled "My Idea of a Perfect Day." All essays were scored holistically by three experts in the field using a 5-point scale that specifically attended to grammar, usage, composition, and mechanical skills and essays were given scores ranging from 0-100.

Findings indicated that self-efficacy made an independent contribution to the performance outcome of writing an essay. In addition, aptitude was shown to have a direct effect on self-efficacy beliefs, which indicated that prior achievement or mastery experience was an important source of efficacy information. Findings that suggested that aptitude had a direct effect on self-efficacy beliefs were in line with Bandura's self-efficacy theory, which posits that prior mastery experience is the strongest source of self-efficacy information (Bandura, 1986, 1997). On the other hand, the findings indicated that writing apprehension and beliefs about perceived usefulness had no direct effects on writing performance. It is possible that since apprehension and ideas about perceived usefulness are byproducts of efficacy beliefs, (Bandura, 1986, 1997) that these two factors were accounted for within the instrument used to measure self-efficacy.

Pajares and Valiante (1997) also examined sex differences in terms of both performance and beliefs associated with writing. What they found is that while sex had no direct effect on performance, it directly affected perceived usefulness, apprehension, and self-efficacy. Overall, girls reported lower writing apprehension, higher writing self-efficacy, and perceived writing to be more useful than their male counterparts. These results were interesting when viewed in light of a prior study conducted by Pajares and

Johnson (1996) which used a similar methodology and found that ninth-grade boys and girls demonstrated no differences in performance, but in this case, it was boys, not girls who reported higher writing self-efficacy. One possible explanation for this about-face in findings is that in some of the literature, self-efficacy has been shown to erode with age (Bandura, 1997). Despite the diverse findings with regards to sex and self-efficacy, both studies indicated a need for interventions that address writing self-efficacy and suggested that teachers must attend to both competence and confidence when it comes to teaching writing (Pajares & Valiante, 1997). The Pajares and Johnson (1996) study further indicated that people engage in behaviors, interpret outcomes of such behaviors, and use personal interpretations of outcomes to develop beliefs about capabilities to inform subsequent behavior in the same domain. It may therefore be inferred that positive experiences in a given domain will more likely lead to additional pursuit of activities in a domain and negative experiences will more likely lead to a tendency to avoid the domain.

Two studies conducted by Schunk and Swartz in 1993 examined the effects of goals and progress feedback on self-efficacy and writing achievement. They hypothesized that the process goal of learning a writing strategy would promote better achievement outcomes than product goals, and that goal progress feedback would further enhance performance (Schunk & Swartz, 1993a, 1993b). Participants in the first study included fourth and fifth graders (Schunk & Swartz, 1993a), but the second study used only fourth-grade students identified as gifted (Schunk & Swartz, 1993b). In the first study, two experiments were conducted; experiment one included 60 fifth-grade students who received language arts instruction in the regular classroom at two schools. In all

there were 33 girls and 27 boys with a mean age of 10 years 11 months and most of the participants were middle class.

Each participant was asked to complete a pretest, which included a measure for both self-efficacy for performing tasks related to writing and writing skill. The skill test asked participants to write a paragraph for four paragraph types which were subsequently scored using four holistic scales, each comprising four points. Following the pretest, participants were assigned randomly into four groups: product goal, process goal, process goal plus progress feedback, and general goal—the last group served as the instructional control group. An instructional program was administered to all participants, followed by a posttest. Instructions given prior to the posttest varied dependent upon which group participants were assigned.

Results from the experiments indicated a positive relationship between goals and feedback and levels of self-efficacy and skills. Overall, the value of the study highlighted the roles that goal setting and feedback can play in enhancing both writing self-efficacy and writing skills. The study further indicated the potential value of incorporating strategy instruction into the curriculum as the second study (Schunk & Swartz 1993b) suggested that the goal of using a strategy with gifted students transferred into another assignment six weeks later. The results of the experiment with gifted students, while slightly different in method, yielded similar results with reference to goals and feedback and levels of self-efficacy (Schunk & Swartz, 1993b). A logical question following the study assessing the transferability of a strategy was would the strategy transfer for populations other than gifted students?

Hypothesizing that goal setting would have a positive effect on writing, Page-Voth and Graham (1999) also examined the effects of goal setting and strategy use in writing performance and self-efficacy, however, the participants in their study were learning disabled students in the seventh and eighth grades. Also, unlike the students in the Schunk and Swartz (1993a; 1993b) studies, the participants were not given feedback. Interestingly, in this study, while the quality of student writing increased over the duration of the study, student self-efficacy did not. Possible reasons for this finding included the short duration of the study and the possibility that students with learning disabilities have been found to over-estimate their academic abilities (Klassen, 2006).

In a study conducted by Pajares and Johnson (1996) that examined the self-efficacy beliefs and writing performance of 181 students entering high school, it was found that the direct effect of self-efficacy on writing performance was as strong as the direct effect of aptitude. It was further found, as in other studies that there was no significant effect of gender on performance or aptitude, but there was a significant effect of gender on self-efficacy. Girls reported lower self-efficacy and boys reported higher apprehension about writing. Overall, self-efficacy had a strong direct influence on writing and students with higher self-efficacy reported lower anxiety, supporting the social cognitive theory premise that anxiety is a byproduct of a lower sense of self-efficacy (Bandura, 1986, 1997). This study further supported the idea that self-efficacy has a developmental component, and that the level of self-efficacy may decrease as students go through school and become more cognitively capable of assessing task demands and of realistically gauging if they have the skills to meet such tasks (Schunk &

Meece, 2006). Furthermore, it was revealed that Hispanic participants had lower self-efficacy, lower aptitude, higher anxiety, and lower performance in writing (Pajares & Johnson, 1996); this indicates a need for additional research on the writing skills, apprehension, and beliefs of minority groups.

The literature on writing self-efficacy at the college level is more abundant than the literature on writing self-efficacy at the grade school level, and the studies conducted provide quality samples that could and should be replicated at the grade school level. Martinez et al. (2011) conducted a study that sought to examine factors that predicted the writing anxiety and writing self-efficacy of university students. Their study included 127 college students, primarily female (n = 97) and Latino (n = 90) at a university on the Texas border, and included students enrolled in diverse classes across all four years of college. While the mean GPA of the participants was 3.15, participant GPAs ranged from 2.0 to 4.0. At the beginning of the semester during which the study was conducted, participants were asked to complete a survey that collected information on demographics, attitudes about leisure writing, writing anxiety level, and writing self-efficacy. Participants were also asked to respond to question-statements related to the beliefs being studied. A 5-point Likert scale was used to evaluate the question-statements. At the end of the semester, participants were asked to complete a post-assessment to ascertain if their attitudes toward writing had changed (Martinez et al., 2011).

Unlike Pajares and Valiante (1997), Martinez et al. (2011) found girls had more anxiety and less writing self-efficacy than boys. Possible explanations for this include Bandura's developmental perspective on self-efficacy or the fact that self-efficacy has

been observed to erode as students progress through school (Eccles et al., 1998; Klassen, 2002; Schunk & Meece, 2006; Wigfield et al., 1997). An additional factor that might help explain these findings is that Latino/a college students who are bilingual might experience higher levels of anxiety caused by their self-doubts with the English language (Martinez et al., 2011). Further studies should also explore the cultural implications of being Latino/a and how that may play into self-beliefs about writing.

Overall the results of the study suggested, as was expected, that writing anxiety was a significant predictor of writing self-efficacy, with students reporting lower levels of writing anxiety simultaneously reporting higher levels of writing self-efficacy. GPA was also positively associated with writing self-efficacy and negatively associated with writing anxiety. This study also examined the relationship between leisure writing and writing anxiety and writing self-efficacy. Students who engaged in leisure writing were less anxious about writing and reported higher levels of writing self-efficacy. While this study had limitations, such as the over representation of females, approximately 3:1, the fact that study participants were 90% Latino, and the reliance on self-report measures, it did serve to further substantiate the findings of other studies indicating the role self-efficacy plays in writing outcomes (MacArthur & Philippakos, 2013; Pajares, 2003; Pajares & Johnson, 1994; Pajares & Valiante, 1997; Schunk & Swartz, 1993a; Schunk & Swartz, 1993b; Schunk, 2003) and Bandura's beliefs about the mediational role of self-efficacy (Bandura, 1986, 1997). A clear strength of this study was its implications for practice, and the role faculty members might play in helping alleviate student writing

anxiety and enhancing writing self-efficacy. Ideas such as faculty support, mentorship, enhanced relationships, and tutoring could all be applied in the grade school setting.

Generally speaking, it has been found that self-efficacy plays a mediational role in the writing anxiety and aptitude of adolescents from grade school to college. Pajares and Johnson (1996) found that students engaged in behaviors or actions, interpreted the outcomes of such behaviors or actions, and used personal interpretations about their capabilities, whether accurate or not, to make decisions about whether or not to engage in further actions or behaviors in a given domain. In the academic domain, self-efficacy plays a vital role in the decisions students make regarding course selection, and perhaps ultimately even in the career paths they believe to be an option.

In their examination of the influence of self-efficacy, writing apprehension, perceived usefulness, and writing aptitude in essay writing, Pajares and Valiante (1997) found that self-efficacy made an independent contribution to the performance outcome of writing an essay. Schunk and Swartz (1993a) found that adding process goals, strategies, and feedback enhanced self-efficacy and improved writing outcomes in fourth and fifth graders, and in further study involving gifted students (Schunk & Swartz, 1993b), the transferability of strategy use was observed six weeks later. Page-Voth and Graham (1999) also found strategy instruction and goal setting to be beneficial in their study involving students with documented learning disabilities, although their study yielded no indication of a positive effect on self-efficacy. In their recent study involving predominantly Latina participants, Martinez et al. (2011) found girls felt more anxious and less efficacious about their writing, and writing anxiety was established as a

significant predictor of writing self-efficacy. The above mentioned studies reinforce the value Bandura's social cognitive theory continues to offer the motivational research involving self-efficacy and writing.

Writing in Science

While writing instruction in the U.S. appears to have improved over the last 30 years, there is still much room for improvement, especially in science and other content areas. Major attempts were made to get all students reading with the passage of the No Child Left Behind legislation in 2001. Later, writing was included in literacy efforts as both a way to boost reading comprehension and as an additional skill in its own right (Pressley, Allington, Wharton-McDonald, Block, & Morrow, 2001). There was also a shift in understanding that more advanced writing skills are required in middle and high school (Applebee et al., 2013) and an acceptance of the importance of writing in the development of knowledge (Hunter & Tse, 2013).

According to the National Committee on Science Education Standards and Assessment and National Research Council (1996), science instruction has placed an emphasis on communication skills for several years. In 2011, *A Framework for K-12 Science Education* advocated for students to learn to build arguments from evidence, obtain and evaluate information, and communicate findings effectively and persuasively (i.e. write effectively). Since the introduction of the Common Core State Standards and the subsequent adoption of the standards by most states, writing has become a central issue, as the Common Core places a high emphasis on writing from an objectives standpoint (Applebee et al., 2013).

Despite increased attention to writing, writing instruction in U.S. classrooms still has a long way to go and it varies greatly by state, school district, and school. In fact, writing does not have a universally accepted framework that maps out what students should be able to do (Applebee et al., 2013). The Common Core (2012) specified three types of writing: narrative, informative/explanatory, and argument, which, in theory should allow various disciplines to incorporate writing into their curricula. However, state mandated testing puts pressure on educators that make it difficult for them to assign writing assignments of any substance. The situation is compounded by the fact that students differ substantially in writing ability (Juzwik et al., 2006), motivation, and other psychological constructs effecting writing (Bandura, 1997), which in turn puts more pressure on teachers who are held accountable for high-stakes test results.

While some scholars advocate for an increased emphasis on disciplinary writing (Bazerman, 2008; Hunter & Tse; 2013; Shanahan & Shanahan, 2014; Wingate, 2006), the reality is, that while writing is occurring in various disciplines, it is not being done in the quantity necessary to encourage and produce quality writers (Applebee et al., 2013) nor from the disciplinary perspective deemed appropriate by Bazerman (2008), Shanahan and Shanahan (2014), Wingate (2006) and others. While science educators acknowledge that writing in many forms, including research papers, is a critical component of good science teaching (Metz, 2012), changes in policy have negatively impacted writing instruction in science classrooms. Ninety percent of science teachers interviewed by Applebee et al. (2013) stated their students engaged in short writing assignments; however, only 53% indicated their students had engaged in at least one task requiring one or two pages of

writing during the school year. It is hardly surprising that by the time students get to college, they are ill-prepared to meet the writing demands of the post-secondary setting in all subjects, including science (Charney, Newman, & Palmquist, 1995; Hunter & Tse, 2013; Watts & Burnett, 2012; Wingate, 2006).

Applebee et al. (2013) compiled extensive data from 20 schools known for their emphasis in writing instruction in five states on what teachers do in terms of writing in English, science, social studies, and math classrooms. What they found was that students are required to write more in English classes than any other single subject, but they write less in English class than they do in the other three core classes combined. This data was based on responses to a question about how often students were asked to write a paragraph or more. In science classrooms, most writing consisted of note-taking and completing worksheets which may have had a short-answer component. Noticeably absent in science classes were in-depth writing assignments that required higher-level thinking and writing ability (Applebee et al., 2013). One student in an upper-level science class stated most writing was in science class was in the form of note-taking and "we don't write much in his class" (Applebee et al., 2013, p. 91). The implication is that students' experiences with writing in all subjects have a profound effect on the overall quality of writing, as well as beliefs about writing.

In their analyses of 2,101 student responses to science assignments, Applebee et al. (2013), found that science assignments were dominated by short-answer activities (66%), fill-in-the blank exercises (24%), and multiple-choice activities (15%). Only 7% of science activities required a paragraph or more of writing. Furthermore, it was found

that typical writing activities in U.S. schools did not encourage the complex cognitive processes required to help students develop into advanced writers: those with the ability to write as they learn and learn as they write (Bazerman, 2008). Thus although science teachers have stated they value writing, such beliefs ae not being translated into practice. High-stakes testing has been shown to be a major factor for this situation.

As mentioned above, Applebee et al. (2013) found high-stakes tests were reported by teachers to influence the time and priority given to writing tasks in their classrooms. In Texas, for example, only in English, must students write to pass the exit test required for high school graduation. Overall, few high stakes test responses require open-ended writing, even in English. Of the questions that do require writing, the range is from fill-in-the-blank to single-word responses to essays.

The nature of writing instruction in U.S. classrooms is according to Applebee and Langer (2009) typically process-oriented. That is to say, for the most part, teachers are telling students exactly what they want from them (e.g., introduction, body paragraphs, and conclusion). Also involved in this process-approach are pre-writing activities, strategies for planning, drafting, and revision planning. Fewer teachers reported spending time teaching writing strategies, though some reported using modeling to teach writing, which according to Schunk and Zimmerman (1997, 2007b) is an effective means by which to teach learners skills. Teacher-led activities were reported to be more popular than collaborative approaches to writing. Despite the lack of breadth and depth of writing assignments in which students engaged, there were some positive learning opportunities occurring in classrooms. Unfortunately, the amount of instructional time

devoted to writing, combined with the few writing tasks assigned, will make it difficult to help students reach the standards they need to acquire to become competent writers.

In breaking down the data, Applebee et al. (2013) found that in the English classes they observed—approximately 3 minutes of a 50 minute period was dedicated to writing instruction—a total of 2 hours and 22 minutes over a 9-week school quarter. Given that English is where most writing instruction occurs, this does not bode well for writing instruction in science classrooms. Furthermore, it was suggested the characteristics of most writing assignments in U.S. classrooms require little higher- level thinking, with rubrics and directions guiding every level of writing assignments in a step-by-step manner (Applebee & Langer, 2011). Writing tasks and instructional practices that promote studying, the construction of new knowledge, or making new meanings (Bazerman, 2008) are uncommon (Applebee & Langer, 2011). In summary, most students in the U.S. receive writing instruction that is considered necessary to help them perform in various assessments, not instruction on writing skills and strategies that would aid them in higher education and beyond (Applebee & Langer, 2009).

Such a premise was articulated in a study by Wingate (2006), who found that trying to teach university students writing skills they failed to acquire at earlier levels using a “bolt-on” or study skills approach was neither effective nor desirable. In fact, she went as far as to say that attempting to do so is counterproductive to learning as it ignores the context of academic writing. Instead she promoted what she referred to as an embedded approach, whereby writing instruction is facilitated at the subject-level. Wingate (2006) maintained that difficulties exist with this approach since many teachers

of content are unwilling or unable to teach writing, believing that basic skills are too far removed from the university setting and workplace, and a failure to understand why such skills cannot be properly mastered separate from the subject matter. Hunter and Tse (2013) also promoted an embedded approach.

Although Wingate's (2006) argument makes sense at some level, perhaps with regards to students in the university setting, there is sufficient research to support the teaching of writing skills through strategy instruction and process oriented approaches at the grade school level (De Milliano, Gelderen, & Sleegers, 2012; Gaskill & Murphy, 2004; Schunk & Swartz, 1993a; 1993b; Schunk & Zimmerman, 2007a). That being said, Wingate's findings (2006) do make the case for teaching younger students to be literate at the content level, a sentiment shared by Bazerman (2008) and Shanahan and Shanahan (2014).

Shanahan and Shanahan (2014) promoted disciplinary literacy at the elementary school level. They defined disciplinary literacy as "the idea that we should teach the specialized ways of reading, understanding, and thinking used in each academic discipline, such as science, history, or literature" (p. 636). This definition reflects the sentiments of Bazerman (2008). While their article related more specifically to reading, the points made can be aligned with writing. This was Wingate's (2006) premise. Given the success of writing strategy instruction at the grade school level, it is conceivable that such instruction could occur in disciplinary settings such as science using an embedded approach.

If such suggestions are applied to writing, it could be argued, as others have, that as students progress through school, they should be taught general writing strategies specific to each discipline. This is based on the assertion that disciplinary differences exist in how knowledge is created and evaluated, and that this has implications for how writing is used and how students develop as writers (Bazerman, 2008). For example, when writing about historical accounts, such as students are often asked to do at the high school level and even at the college level in the form of Document Based Questions, writers may always contest such accounts. However, a student writing about why a math formula is used may provide less freedom for contesting such information. Students writing about science, whether experimental or a subject such as Environmental Science should write with a goal of deepening their understanding of results, bias, as well as its inter-disciplinary nature. In summary, Shanahan and Shanahan (2014) suggest disciplinary literacy starts early. Bottom line—students need to be writing in all subjects—with applicable instruction and support. While this sounds good in theory, there is no discussion on variations in ability, the teaching of basic literacy—a necessary foundation for disciplinary literacy, or the current climate of high stakes tests and how that impacts literacy in general, a component of which is writing.

Bazerman (2008) discussed commonalties and differences among students as they engage in varying writing tasks and honed in on the cognitive processes involved. At some level, he stipulated, there are common cognitive processes all students go through, for example, when they fill out forms versus writing an in-class essay, and within those commonalities are differences, dependent upon the individual. Based on the

commonalities found in specific genres, it is postulated that exploring writing within the science classroom is a worthy endeavor. Bazerman (2008) further posited that specific genres and specific contexts influence how the processes of producing, planning, reflecting on, and structuring text unfold.

Other researchers have promoted ideas on how to incorporate learning to write within science-specific contexts. Watts and Burnett (2012) conducted a study involving university students to examine if students in paired courses (English and Agronomy) would write better professional reports than students in the Agronomy class alone. Findings supported that when educators collaborated effectively in the paired courses, students in these courses wrote more superior reports than those enrolled only in the Agronomy course. Of imperative nature in the successful findings was the way in which individual instructors worked together to promote simultaneous growth in Agronomy content and writing. By co-assigning and co-assessing certain assignments, and providing collaborative feedback, students incurred positive gains. Success of the study was attributed to the fact that tasks were "done by teams in dual problem-solving spaces, not individually isolated classes (Watts & Burnett, 2012, p. 229). This is reminiscent of the goals of the writing across the curriculum movement (Applebee et al., 2013).

Teachers involved in writing across the curriculum were for the most part positive about the goals of the program and it was found that science teachers rated specific types of writing as important in the science classroom. These included formulating hypotheses and making deductions, proving explanations of science concepts, recording observations, and writing lab reports (Applebee et al., 2013). In reality, in an educational

world that is largely defined by pacing guides, benchmark testing, and high-stakes tests, taking the time out of a class period to engage students in meaningful writing is challenging (Applebee et al., 2013).

It is apparent writing is a critical and controversial topic. There are multiple ways of viewing the process, many beliefs on best-practices as regards teaching writing, divergent opinions on approaches, and pressure from multiple spheres to improve the writing skills of students. Applebee et al. (2013) offered valuable insight into what is occurring in many schools across the nation and suggestions for addressing writing in English, science, social studies, and math classes. Wingate (2006) was critical of the study skills or "bolt- on" approach to writing in the university setting. Hunter and Tse (2013) found promise in pairing a science class with an English class at the college level, and Bazerman (2008) provided deep insight about genre and cognitive development. Finally, the process approach to writing has been found effective at the grade-school level (Harris et al., 2008).

With all of these valuable contributions to the field, it seems that there is still a place for writing interventions within the context of the science classroom. One promising approach for such interventions are those which take a socio-cognitive perspective view of writing, understanding that not only is writing a socially or contextually situated construct, but that it is also impacted by behavioral and personal characteristics. Furthermore, given the lack of in-depth training science pre-service teachers receive in writing instruction, the SRSD approach is a sound, research-based

approach that could be adopted by science teachers who wish to enhance their students' writing skills and confidence.

Conclusion

Social cognitive theory, specifically the constructs of self-efficacy and self-regulation, provides a powerful theoretic framework through which to study human thought and action. In particular, the theory is a useful tool for studying student performance in school across multiple domains and may give insight into what students draw upon in order to be successful. While studies based on social cognitive theory have been criticized, for example, researchers have been observed to limit themselves to analyzing study results based on the individual as the unit of analysis, despite the bidirectionality of the model as posited by Bandura (1986) (Tudge & Winterhoff, 1993), even with its limitations, investigating the factors involved in student success using social cognitive theory allows for an approach that considers that interaction of the person, behavior, and environment. Incorporating additional motivational constructs such as goal setting into a study permits the possibility for findings that have implications for practice. Finally, using the theory in a way which takes into account its dynamic nature, it should be possible to examine the dynamic multiple dynamic psychological constructs.

It is evident that self-efficacy is a powerful construct, and overall the literature is supportive of Bandura's social cognitive theory and the role of self-efficacy in education and beyond. It has been shown time and again that self-efficacy plays a major role in individuals' lives across many domains. Academic performance and outcomes are affected by self-efficacy (Usher & Pajares, 2008); students with higher beliefs in their

capabilities are more motivated and are more likely to be successful and school, and thus less likely to drop out. It is logical that studies looking for insight into student self-beliefs and how they affect student performance should explore self-efficacy and the mediational role it is posited to have.

Strategy instruction has been, and continues to be shown to be a powerful force in the writing outcomes of struggling writers. It appears that there is great promise for future studies based on social cognitive theory that aim to improve the results of adolescent writers. While much of the work to date had been done with learning disabled writers, NAEP results suggest that the scope of the writing problem in the U.S. reached far beyond students with documented learning disabilities. All in all, the potential to work with students on enhancing their self-efficacy, while simultaneously addressing deficits in writing is an exciting avenue for research at the middle and/or high school level.

CHAPTER III

METHODOLOGY

Introduction

This primary goal of this study was to test the effects of a writing intervention designed to improve high school students' self-efficacy for writing science research papers, reduce anxiety related to writing, increase the use of self-regulatory strategies, and as such improve the quality of science research papers. The methodology employed in this study is presented in this chapter. The chapter is organized into nine sections: (i) philosophical assumptions, (ii) why mixed methods?, (iii) the embedded design, (iv) selection of participants, (v) instrumentation, (vi) data collection methods, (vii) the intervention, (viii) data analysis, and (ix) validity and reliability.

Philosophical Assumptions

Merriam (1998) encouraged researchers to make clear philosophical orientations and epistemological beliefs that influenced study design and framework. Since a researcher's personal worldview or paradigm lays the foundation for a study, guiding every aspect of the process, including design and methodology, elucidating this helps readers understand assumptions and biases a researcher may bring to the table (Creswell, 2003; Creswell & Plano Clark, 2011). Specifically, this study proposed to take a pragmatic stance. Pragmatism is rooted in the work of James, Mead, Dewey and Peirce (Cherryholmes 1992; Creswell & Plano Clark, 2011). Examples of contemporary

researchers known for work that takes a pragmatic approach are Cherryholmes (1992) and Patton (2002).

According to Creswell (2003), mixed methods researchers, in an effort to bypass the paradigm debate, have sought to identify the "best" philosophical assumptions to complement mixed methods research. Tashakkori and Teddlie (2003) identified at least 13 mixed methods researchers who suggested pragmatism as the best philosophical stance for the mixed methods approach to research. Pragmatism has at its roots, the idea that using what works best to capture information that helps answer research questions is most desirable, and as such, is open to using both quantitative and qualitative methods in a research study. Furthermore, a pragmatic approach permits consideration of both subjective and objective knowledge. Finally, Tashakkori and Teddlie (2003) explicitly connected pragmatism and mixed methods based on the following: Mixed methods research permits the use of quantitative and qualitative methods, research questions are of primary importance in guiding methodology, the idea that a practical and applied research philosophy should guide methodological stances, researchers should not have to choose between post-positivism and constructivism, and the suggested abandonment of concepts such as "truth" and "reality." Patton (2002) suggested using pluralistic approaches to learn about research problems and added that pragmatism is primarily concerned with what works and solutions to specific research problems in social sciences. Onwuegbuzie and Leech (2005) suggested an increase in methodological pluralism, encouraging more researchers to embrace pragmatism.

Why Mixed Methods?

In recent years, mixed methods research has gained ground in the field of education (Johnson & Onwuegbuzie, 2004) and has been more popular in the social sciences field in general due to its ability to generate information through utilizing multiple sources (Greene, 2007). In order to best address the research questions investigated in this study (Tashakkori & Teddlie, 2003), a mixed methods research design was employed. According to Creswell and Plano Clark (2011), mixed methods involves the collection, analysis, and mixture of quantitative and qualitative approaches across the research process in a single study or series of studies. In summary, using mixed methods permitted the combination of the two traditional methodological approaches to research problems and offered the potential for enhanced understanding of the phenomena under study (Creswell, 2003; Creswell & Plano Clark, 2011; Johnson & Onwuegbuzie, 2004).

The rationale for selecting mixed methods in this study was to facilitate the use of quantitative instruments in combination with microanalytic assessments and informal observations. Truscott, Swars, Smith, Thornton-Reid, Zhao, Dooley, and Matthews (2010) further contended that mixed methods are an ideal means by which to research the complex issues found in education. It has been suggested that using quantitative and qualitative methods in combination offers the potential for deeper insight into research problems in general (Greene, Caracelli, & Graham, 1989; Onwuegbuzie, Johnson, & Collins, 2009; Tashakkori & Teddlie, 1998), and more specifically those in the field of education. Finally, "the bottom line is that research approaches should be mixed in ways that that offer the best opportunity for answering important research questions" (Johnson

& Onwuegbuzie, 2004). Philosophically, mixed methods were the best means by which to address the research questions studied.

While no mixed methods studies on writing and self-efficacy per se could be located, an example of a study that showed the potential benefit of mixed methods research on the broader construct of academic self-efficacy was Perry, Dewine, Duffy, and Vance's (2007) investigation of the academic self-efficacy of urban youth. The researchers hypothesized that traditional quantitative evaluation methods for measuring self-efficacy, that is surveys and questionnaires, were insufficient to capture the more subtle changes in academic self-efficacy that other research methods have the potential to uncover. More specifically, a mixed methods design was utilized to see if a lack of statistically significant differences in academic self-efficacy was truly indicative of no improvement in skills associated with the construct, such as improved study skills and note taking (Perry et al., 2007). The mixed methods procedures employed confirmed the hypothesis and showed how mixed methods created an opportunity to uncover internal gains in academic self-efficacy that may have remained invisible in a purely quantitative study. If the researchers had relied solely on quantitative data provided by surveys, they may have erroneously inferred that the intervention failed to have the positive impact it did on the academic self-efficacy of participants. Through mixing methods, the researchers were able to provide a more complete picture or knowledge (Greene, 2007), contradict prior findings, and thus better understand the phenomena under investigation.

In empirical studies, self-efficacy has been shown to play a significant role in writing performance (Bruning et al., 2013; Gaskill & Murphy, 2004; Page-Voth &

Graham, 1999; Pajares & Johnson, 1994, 1996; Schunk & Swartz, 1993a; Schunk & Swartz, 1993b. To date, most studies purporting to investigate the influences of student self-beliefs on writing performance appear to have been quantitative or experimental in nature. The lack of alternative perspectives on writing self-efficacy creates a gap in the literature.

Pajares and Johnson (1996) specifically stated that qualitative studies should be undertaken to examine how student writing beliefs are developed and to study what connections students make between these beliefs and their writing outcomes, and ultimately the academic paths they pursue. Qualitative studies that focus on rich rigor, or "complexity and abundance" (S. J. Tracy, 2010, p. 841) offer the opportunity to examine what is going on from a more in-depth and personal perspective. A mixed methods study provides the opportunity to use the rich data that may be acquired through qualitative methods and combine it with quantitative data associated with the traditional studies of self-efficacy to acquire more in-depth findings.

In addition to the general lack of studies examining writing from a motivational perspective that are not quantitative in nature, most studies have examined students at the elementary (Pajares & Valiante, 1997; Schunk & Swartz, 1993a; Schunk & Swartz, 1993a) and college (Pajares & Johnson, 1994) levels. Fewer studies have examined the impact of writing self-efficacy beliefs in high school students, signifying a further gap in the literature. Given high school is a time when adolescents make important decisions and self-efficacy has been shown to impact such decisions (Bandura, 1977, 1986, 1997; Pajares, 1996; Schunk & Meece, 2006), it seems fitting that a study examining high

school students' self-beliefs on writing be carried out. A mixed methods study provides an epistemological and methodological alternative to the literature currently available. Finally, no mixed method studies could be located that specifically addressed science-writing, and none that addressed science writing self-efficacy and writing apprehension.

Expanding the research field of writing self-efficacy to encompass mixed methods studies will benefit the field of motivation as a whole. In addition, if such research can lay the foundations for new instructional practices that aim to protect and promote self-efficacy in writing, as well as improve student writing outcomes, such studies have the potential to inform practitioners at all levels and across the curriculum as to why self-efficacy in writing diminishes as students progress through school. Ultimately, potential transformations hold the promise to help encourage self-efficacy in writing, and on a broader level help create future generations of highly literate students who have the prospect of competing and succeeding in the global economy.

The Embedded Design

Specifically, an embedded design was selected as such a design allows for a qualitative strand within a more traditional experimental design (Caracelli & Greene, 1997; Creswell & Plano Clark, 2011). In an embedded design, the collection of supplemental data may occur before, during, and/or after the onset of data collection and analysis. This research design lent itself well to the microanalytic assessments and informal observations as it permitted data collection at times which corresponded to Zimmerman's (2000) three-phase cyclical loop. A primary argument for an embedded design is that one data set is not sufficient to address the research questions.

Furthermore, such a methodology provided a means by which to answer secondary research questions within the study. Victor, Ross, and Axford (2004) suggested an embedded design was appropriate to examine the process of an intervention, while Evans and Hardy (2002) suggested using an embedded design to help explain reactions to an experiment. Since microanalysis is generally defined as "a highly specific or fine-grained form of measurement that targets behaviors or processes as they occur in real time across authentic contexts" (Cleary, 2011, p. 330). The embedded design helped capture valuable information on how motivational processes changed following the intervention.

In employing an embedded design, it was assumed that while the quantitative data were connected to the primary purpose of the experiment (i.e., to ascertain if the intervention had a significant effect), the purpose was, in fact, different. Mixing methods, typically quantitative and qualitative, created a framework of creative tension (Caracelli & Greene, 1997) and helped "to obtain different but complementary data on the same topic, rather than to replicate results" (Morse, 1991, p. 122). Researchers often use the embedded design as a way to maximize the strengths, while limiting the weaknesses of quantitative and qualitative methods (Johnson & Onwuegbuzie, 2004). An embedded design presumes the researcher has different research questions requiring different types of data and analysis, and that by using a variety of data, the overall design is enhanced and the results more robust (Creswell & Plano Clark, 2011). Further, it was hoped the embedded design would help uncover important information regarding the impact of the intervention on the dynamic nature of student writing self-efficacy, writing

apprehension, and strategy use. Such information is not easily uncovered through traditional quantitative methodologies in isolation and mixing methods has the potential to provide new insights into such phenomena.

In this study, the embedded design was selected to permit the examination of the impact of a writing intervention with a motivational component. Further, there has been some suggestion traditional quantitative evaluation methods for measuring self-efficacy, that is surveys and questionnaires, are insufficient to capture the more subtle changes in academic self-efficacy that other research methods have the potential to uncover (Perry et al., 2007). More specifically, an embedded mixed methods design was utilized to see if a lack of statistically significant differences in writing self-efficacy and writing apprehension was truly indicative of no improvement in skills associated with the construct, such as more positive feelings about the ability to write and improved use of strategies and outcomes, as well as to better assess the true impact of the intervention. Through the use of microanalytic assessment methods within this embedded design, the researcher explored the ways in which participants were thinking and why they were doing what they were doing at various points in time within the study. It was hypothesized that data gathered through qualitative data might challenge or further support the results of the quantitative scores and would add rich, in-depth insight to the dynamic characteristics of the processes investigated.

Selection of Participants

The site for this study was a parochial high school in a Mid-Atlantic state. Selection of the site was based on researcher familiarity with the school and access to

participants. Having spent more than eight years in the setting in roles including Director of Learning Support and running an in-house tutoring program, I was familiar with the strengths and weaknesses of student writing across the curriculum. In addition, I hold a master's degree in education and am licensed by the state of North Carolina as a teacher in Special Education, K-12: General Curriculum and am a certified Reading Specialist. Finally, I am considered "Highly Qualified" per licensure requirements in Language Arts, Math, Science, and Social Studies. More important than professional qualifications, I felt and continue to feel passionate about providing students with tools that would serve them with their writing, not just in high school, but in the postsecondary setting. It was hoped this writing intervention would serve teachers across disciplines in the school and others like it, and perhaps with modifications in more diverse settings.

Demographically, the school is predominantly White, and for the most part serves students from middle to upper middle class families. Exact demographic data were requested, but never received. Parents pay for their students to attend the school and in many cases students drive long distances to the site. The school claims to be the largest non-public high school in the area and that it has received national recognition as one of the top 50 Catholic schools in the United States. The curriculum is considered college preparatory, and according to information available on the school website, is organized on what is referred to as "three levels:" standard college prep, honors, and advanced placement. Students must take a placement test in order to gain admission to the school. The student body is not reflective of the community at large and this is further addressed in the limitations section.

The Students

Since a mixed methods approach was utilized, sampling procedures associated with qualitative research were employed (Maxwell, 2013). While the initial sampling strategy could be considered convenience sampling, within the convenience sample, purposeful sampling was used. As there were three levels within the curriculum at the research site, it was important that students, who were most in need of the intervention, had the opportunity to receive it. According to Merriam (1998), "purposeful sampling is based on the assumption that the investigator wants to discover, understand, and gain insight and therefore must select a sample from which the most can be learned" (p. 61). Purposeful sampling may also be used as researchers strive to select participants with whom they may establish the most productive and positive working relationships. Given the breadth and scope of the research, productive and positive working relationships were preferred.

While this may appear to be convenience sampling, and thus a limitation, according to Maxwell (2013), this form of purposeful sampling is widely used and is purposeful in that "it is intended to provide the best data for your study" (p. 99). Maxwell (2013) further suggested there are at least five reasons for purposefulness in participant selection, and of these, the researcher was primarily interested in ensuring the maximal potential in capturing a range of variation in terms of writing self-efficacy and to allow for comparisons in student performance before and after an intervention. Creswell and Plano Clark (2011) defined purposeful sampling as when "researchers intentionally select (or recruit) participants who have experienced the central

phenomenon or the key concept being explored in the study" (p. 173). Finally, the sampling procedure aligns with the purpose of the study, as it has the potential to select the most "information-rich" cases (Merriam, 1998, p. 62). Purposeful sampling is considered an acceptable sampling method by distinguished scholars (Creswell & Plano Clark, 2011; Maxwell, 2013; Merriam, 1998).

For reasons stated above, students in two higher level (i.e., designed for junior and seniors) science college-prep level classes, Marine Science and Zoology, were invited to participate. Students in the higher grades were deemed more appropriate for the intervention as they would be attending college sooner, and thus there was more urgency to help them develop important writing skills. Students enrolled in these classes are for the most part juniors and seniors, and have failed to meet the standards set forth by the school to be in Honors or Advanced Placement science classes. It could therefore be inferred that some students in these classes possessed some of the weakest academic skills in the school.

Instrumentation

The Self-Efficacy for Writing Scale (SEWS)

Since no instruments could be located that measure self-efficacy to write a research paper, one well-known measure of writing self-efficacy was combined with a scale created by a graduate student at George Mason University: The Self-efficacy for Writing Scale (SEWS), adapted from Pajares, Hartley, and Valiante (2001) and the Self-efficacy for Writing Scale (Mills, 2010). Four questions came from Pajares et al.'s (2001) writing self-efficacy scale. Question numbers 6, 7, 9, and 10 were used since they

ask questions about beliefs in one's ability to complete tasks that are essential to writing quality research papers. The other questions from this instrument were eliminated as they were either deemed to address skills too basic for high school students or were irrelevant from a genre perspective (e.g. a student's beliefs about his or her ability to correctly spell all words in a one-page story).

The remaining 16 questions came from Sara Mill's (2010) *Development of a self-efficacy for writing scale*, which was developed to measure self-efficacy for writing persuasive essays. Her instrument is based on Bandura's (2006) suggestion that self-efficacy scales be tied to a specific task; hence the questions created are related specifically to research papers. The quality of her items is high as evident by statistical analyses cited in her work. Additional analyses of the SEWS was conducted by calculating the Cronbach's α coefficient using data collected from two Chemistry classes. The Cronbach's α coefficient for the SEWS is .806, suggesting good internal consistency and thus reliability of the instrument.

The Writing Apprehension Test (WAT) (Daly & Miller, 2013)

The WAT was used in the original format presented by Daly and Miller in 1975. At that time, the authors used a split half technique to calculate the reliability of the instrument. Daly and Miller (1975) concluded that the reliability of the instrument was .940 and that test-retest reliability of the instrument over a week was .923.

Microanalytic Assessments

Five microanalytic assessments were administered during the study to examine five key self-regulatory sub-processes (i.e., goal-setting, strategic planning, monitoring,

self-evaluation, and attributions). The first prior to the pretest, the second following feedback on pretest essays, the third during independent practice, the fourth immediately preceding the posttest, and the fifth following the posttest. Interestingly, Bandura (1977) first introduced the idea of microanalysis while studying adults' self-efficacy beliefs over the course of an anxiety-reducing intervention. It has been suggested that microanalytic assessments provide valuable and unique information compared to measures such as surveys. Reasons cited for this include the ability of such instruments to detect and study behaviors as they occur during real time, authentic situations (Cleary, 2011). Five microanalytic assessments were designed to probe the more fine-grained behaviors and thoughts participants had during the study. Five constructs were considered when designing the microanalytic assessments: self-efficacy, attributions, goal setting, strategy choice, and apprehension. Microanalytic assessments permitted an examination of the forethought, performance, and self-reflective aspects of the writing task. Students' scores on similar scales showed predictive reliability in research involving expert, non-expert, and novice volleyball players (Kitsantas & Zimmerman, 2002).

Cleary (2011) suggested microanalytic assessments may provide important information in educational contexts, specifically, to establish the efficacy of an in-depth intervention program. Such measurements provided insight into students' motivational beliefs and behaviors while they engaged in writing science-relate research papers. In other words, such instruments consider the fluid and dynamic nature of learning and performing. Cleary also suggested microanalytic assessments are an ideal means by which to assess SRSD interventions as they permit measurements at clearly defined

times, before, during, and after an intervention. Such a dynamic "real time" measure in the field of science writing, is to date, non-existent.

Informal Observations

Two informal observations were conducted during the study, one during the pretest and the other during the posttest. Informal observations were carried out to provide a means by which to inform the research on participants' behaviors from a different perspective. Greene (2007) has referred to this as complementarity and expansion. Observations allowed for an opportunity to gather information that might not be inferred from the surveys and/or the microanalytic assessments. For example, differences between strategies participants stated they planned to use and those they did use. Prior to the pretest, several categories were noted, however, as the pretest progressed, more categories were added to reflect what was occurring during that time. The information gathered during the two informal observations added unique insight and richness to the results of the study.

Data Collection Methods

After required Institutional Review Board permissions were obtained (see Appendix A), parents received a letter stating that students would receive a writing intervention during their science classes. All consent and assent forms were signed and returned (see Appendixes B and C). A follow up telephone call was planned in the event permission forms were not returned (see Appendix D). In this mixed methods study, various forms of data were collected in an effort to address the research questions as fully as possible and to enhance the study's internal validity (Merriam, 1998). "Practical, but

creative, data collection consists of using whatever resources are available to do the best job possible" (Patton, 2002, p. 402). Data collection occurred in three phases, before, during, and after the intervention. Within these three phases were twelve data collection points, five prior to the intervention, one during the pretest, two during the intervention, one in the form of the posttest, and three following the intervention.

General Procedures

Phase I. The first step of data collection included surveys to capture demographic information (see Appendix E), information about students' writing self-efficacy (see Appendix F), and information about writing apprehension (see Appendix G). All surveys were administered in person, using pencil and paper, and instructions and questions were read aloud to the participants.

The second step of data collection comprised the first, structured microanalytic assessment (Cleary, 2011; Cleary, Platten, & Nelson, 2008; see Appendix H). While participants may answer questions on surveys, such procedures allow only for fixed answers and prohibit participants from answering questions in their own words (Patton, 2002). The ultimate goal of the microanalytic component was to capture the rich responses surveys preclude (Kvale, 1996). Although it has been suggested that individualized assessment is an essential feature of microanalysis to minimize the effect of social influences (Cleary & Zimmerman, 2001; Kitsantas, Zimmerman, & Cleary, 2000), Cleary (2011) and Cleary et al. (2008) have suggested small group contexts are appropriate. In contrast to earlier microanalytic studies which relied on one-on-one, verbal microanalytic assessments, a small group scenario was used and participants were

asked to write down their responses. Having participants follow such procedures provided two advantages in this study. First, the chances of social or peer influence were much reduced, and second, the researcher gathered microanalytic information from more participants in a timely manner. The purpose of this microanalytic step was to gather supplementary, qualitative data on the forethought phase of self-regulation (Zimmerman, 2000, 2002a, 2002b), which includes how efficacious and apprehensive students felt about writing a research paper on a science-related topic. Questions were relatively broad in scope to minimize influence on pretest performance. For example, questions on specific components of research papers such as thesis statements were avoided as such questions could have constituted a form of pre-teaching.

Following the administration of the surveys and the first microanalytic assessment, participants completed pretests in the form of research papers on a science topic. Participants could choose from multiple topics which were taken from the teacher-provided curricula. They were provided with directions and a detailed rubric explaining all requirements. Pre-test essays provided baseline information on participants' abilities to write research papers and scores for comparative purposes. Following the pretest, all papers were scored using a rubric and handed back to participants. An additional person, a veteran high school writing teacher, scored each paper to increase the reliability of scores and decrease the effect of potential researcher bias.

Step four of data collection involved the re-administration of the surveys. Data gathered during pilot testing suggested that feedback may impact participants' self-beliefs

and thus the purpose of this step was to measure the strength and/or direction of the effect.

The fifth step of the data collection consisted of the second microanalytic assessment. The purpose of this assessment was to gather qualitative data on how participants' self-beliefs were influenced by feedback. Adding a microanalytic component to the survey data allowed the researcher to delve into the ways in which students were thinking after receiving feedback on the pretest. Further, doing so permitted the acknowledgement and analysis of the dynamic nature of self-beliefs. The sixth step of data collection, the first informal observation, occurred during the pretest.

Phase II. The seventh step of data collection during the study began during the SRSD writing intervention (see Appendix I). The lessons contained self-regulatory and motivational components and were based on the extensive work of Harris et al. (2008). During the intervention, based on findings from the pilot study, a detailed notebook was kept in which students' comments regarding the intervention were noted. It was noticed during the pilot study that participants were actively using the strategies being taught in other contexts. Such comments indicated the presence of a feedback loop, whereby learners were using feedback on what they learned to promote changes in how they approached similar tasks in other contexts (Zimmerman, 2000). Behaviors were also observed that provided insight into how participants altered their approaches to writing papers from pretest to posttest. This qualitative information added further richness to the data.

Specifically, step seven of data collection occurred during the independent practice stage of the intervention. Although prior to the pilot study, it was intended that all participants would write their own research papers using the strategies taught, it was decided that group practice would enhance this aspect of the intervention. Based on observations during the pilot study, interviews following the intervention, and research (Applebee et al., 2013), it was decided that collaborative practice would be more powerful. The purpose of a microanalytic assessment during the practice was to help ascertain what participants were thinking and doing at key points during the writing process, and how their thought processes differed from those experienced prior to the intervention.

Phase III. The eighth step of data collection occurred after the intervention was completed. At this time, participants also completed the fourth microanalytic assessment. Following the survey administration, participants completed a posttest, the ninth step of data collection, to see if the intervention had an effect on the quality of their research papers.

During the posttest, a second, informal observation occurred. The purpose this tenth step of data collection was to see if participants' behaviors and actions varied from those observed during the pretest. Following the posttest, participants completed the surveys for the last time during the eleventh step of data collection to assess if there was a statistically significant difference in writing self-efficacy and writing apprehension for writing science-related papers following the intervention. The final and twelfth step of data collection was the fifth microanalytic assessment. The purpose of this assessment

was to elicit information on how students felt at that time regarding their capabilities to write a research paper on a science-based topic and how anxious they were. Through this phase, it was hypothesized that participants would exhibit characteristics of Zimmerman's (2000) self-refection phase of self-regulation.

The Intervention

The intervention, based on the work of Harris et al. (2008), consisted of five detailed lesson plans (see Appendix I) and was implemented in two science classrooms over a total of 15 class periods. The goal was to help students who may not have received adequate writing instruction learn strategies to help write research papers in science classes. Students who have received inadequate instruction in writing often feel less efficacious about their writing, more apprehensive, and lack strategies to write quality research papers. Understanding that writing is a complex and recursive process (Bazerman 2008; Hayes & Flower, 1980), this intervention was designed to provide an effective starting point for writers who lack experience in writing research papers in science, and in many cases, significant experience with any writing. Schools are failing to teach writing in sufficient detail and are not providing opportunities for students to write products of substance (Applebe & Langer, 2013). The lessons described below were designed specifically for students in a marine science class and a zoology class, but the lessons could be modified for any science class. Furthermore, with further adaptations, they could be tailored to teach the research writing process in other content-area classes.

Prior to the intervention, folders containing all required documents were prepared for participants. These folders remained with the researcher until the end of the study. It was realized during the pilot study that much time was used passing out the various documents designed for the intervention. The folders were color-coded by class and each one had a participant's name on it.

Lesson 1

May I take my folder home for the weekend so I can use it to help me write my research paper for English?

Following introductions and icebreaker activities, Lesson 1 began. The goal of Lesson 1 was to help me get a feel for the level of knowledge participants had about research papers. Following the pretest, it was important to hear, in participants' own words, what they felt made a good science research paper. Lesson 1 provided the opportunity to develop background knowledge and set the context. Following this interactive discussion and sharing of opinions, participants brainstormed definitions of basic terms until a consensus, one which correctly reflected each definition, was reached and all definitions were written on the Vocabulary Terms Worksheet (see Appendix I).

Next, participants were provided with a more thorough description of the components of a quality science research paper, specifically a strong thesis statement, an introduction, relevant body paragraphs (containing topic sentences, relevant facts, and transitions), and a conclusion. Students were introduced to the concept of a working outline, which will be described in more detail below. Finally, two sample research papers written by prior students were interactively read and critiqued. Participants were

asked to identify certain elements in each paper and to discuss the strengths and weaknesses of each. This activity provided the opportunity for participants to be exposed to the writing of others and for reflection. Lesson 1 ended with a recap of what was discussed and a brief of description of what would be covered in Lesson 2.

Lesson 2

Can I have a copy of the outline template to help my friend who is not in this class?

The purpose of Lesson 2 was to introduce participants to the PLANTOS strategy to help them plan, organize, and write quality, science research papers. In order to connect the strategy to real-life experiences other than writing, a general discussion on the value of setting goals and planning in life was held. Each step of the PLANTOS strategy was then discussed as outlined on the PLANTOS Mnemonic Chart (see Appendix I). "P" (Pick goals) involved brainstorming goals. Examples of goals participants came up with included making good grades, winning a state championship, getting into a good college, and getting married and having kids. Most participants believed planning and setting goals makes sense in many facets of life. The PLANTOS Goal Chart was then referred to (see Appendix I). The purpose of this chart was to provide participants with some basic goals they could use when writing papers. Practice goals were then discussed and noted on the Goals Worksheet (see Appendix I). It was made clear to participants that the goals we came up with were sample goals and that they should tailor them to meet personal goals and preferences, while keeping in mind genre and audience. This was not intended to be a one-size-fits-all approach every participant

would use for the life-course, but more of a starting point to be used until processes involving goals were internalized to the extent they may serve the appropriate purpose.

"L" (List goals) was an opportunity for participants to brainstorm, and then write down relevant goals that might be set prior to writing a science-based research paper. This step also provided the chance to discuss any illogical goals that came up. "A" does not stand for anything; it is there to help the mnemonic read better. "N" (Make notes) provided a chance to discuss why conducting research and making notes is critical prior to coming up with a thesis. Instruction on taking quality notes was provided at a later time. Participants were told that during the lessons, they would be using note cards to organize their research, but were encouraged to use trial and error to discover what works best for them. Suggestions we came up with included Microsoft Word, Google Docs, paper and pencil, and spreadsheets. Again, it was emphasized that the purpose of the strategy was to provide a starting point: one which each participant could tailor to their own learning and writing styles, as long as they were appropriate to the goal of writing a science-based research paper.

"T" (Generate a thesis statement) was an opportunity to recall what a thesis statement is, its purposes, and to discuss when it might be appropriate to come up with a thesis statement and conditions under which it might be fitting to change a thesis. The intention was to help participants further experience the recursive nature of the writing process. "O" (Outline) introduced students to the concept of a working outline by providing them with the Working Outline Roadmap (see Appendix I) to help them see that when in doubt about what to do, they could use an outline to provide structure and

guidance. The goal of the outline was to provide structure and guidance for participants to help ameliorate the absence of prior instruction—a source of much confusion and anxiety. Participants were additionally provided with the Working Outline Template for future reference (see Appendix I). "S" (Sequence notes), the final phase of the planning phase of the strategy, was explained as a way to encourage participants to organize research prior to writing. The goal of this stage was to help participants see the value of organization to the writing process.

While instruction and discussion on PLANTOS ended, a conversation then ensued which included writing the paper, testing goals initially set, and editing and revising. At the end of Lesson 2, participants were encouraged to commit the steps to memory and were prepared for Lesson 3, the most intensive part of the intervention.

Lesson 3

I'm using what you showed me to work on my writing portfolio for Guilford College.

Lesson 3 provided an opportunity for the researcher to model the PLANTOS strategy, including the use of detailed self-statements. The demonstration was highly interactive and participants assisted in writing parts of a research paper, while practicing what they had learned. Once the demonstration was completed, students came up with their own self-statements to assist them with staying motivated, building self-efficacy, and overcoming obstacles they may face during the writing process. In the interest of time, a topic relevant to the class curriculum was pre-selected (dead zones in the marine science class and the arthropod-transmitted disease, Lyme disease, in the zoology class).

Together, as a class, we went through every step of the PLANTOS strategy and implemented each step as a group. As we worked, I used a computer with a projector, allowing students to see every step, notably the recursive nature of the process, or how it was not only acceptable, but normal to go back and forth as we made our way through the process. Throughout the process, I verbalized my thoughts to help students see what I was thinking as I set goals, conducted research, came up with a thesis, and all other aspects of the process. It was important for participants to understand that writing is a complex process, one that requires highly engaged, and in some cases deliberate thought processes.

During Lesson 3, participants were exposed to various online resources on the topics and a discussion was held on the quality of sources. Eventually, the group decided which sources to use and all students had the opportunity to make notes on note cards from the sources. Participants were shown how to use a citation maker and made aware of the strengths and weaknesses of the tool, and MLA was discussed. Although MLA may not be the most widely-used format for science research papers, it was the format with which the participants were already most familiar. Given time limitations, it was decided to use MLA versus teaching participants an entirely new formatting style, although other formats were discussed. A discussion of plagiarism and how to avoid it was held, and ways to help with organization and research were explored and implemented. Once it was felt that participants had an adequate working knowledge of the topic, instruction and practice on writing a thesis statement ensued. It was suggested that writing a thesis statement with three clear elements could help students as they

learned to become more proficient writers within the genre. This part of the lesson was quite time-consuming, as it was the participants who came up with the thesis statement. After hearing possible thesis statements modeled on other topics, participants were asked to volunteer or were called upon to come up with a potential thesis statement. The first thesis statement was written on the white board by the researcher, and a discussion followed on how it could be improved. Once consensus was reached, everyone committed to a thesis statement.

With a thesis statement ready to use, it was added to the working outline, and this document became the basis for the remainder of Lesson 3. After completing all of the steps described above, steps that were at times clearly challenging for participants, time was taken to address the power (positive and negative) of self-statements. A discussion, starting with questions, was led by the researcher on the power of what we tell ourselves, or self-statements. Students shared examples of some of the negative messages they told themselves and with prompting, came up with some positive messages that could replace them. Next, participants were provided with a Self-Statement Table (see Appendix I) which had sample negative self-statements on it. During the pilot study, a blank table was found to lack effectiveness, thus negative statements were provided. The purpose of this exercise was to help participants realize that during the writing process, like many other tasks, it can be challenging and to provide a means by which to work through such challenges.

With an understanding of the power of self-statements, we then worked through the working outline, from the introduction to the conclusion. While the idea of a “five-

paragraph" essay was debunked, we did write five paragraphs during the intervention due to time constraints: introduction, three body paragraphs, and a conclusion. The introduction was compared to a funnel, starting broad and narrowing down to the topic, while the body paragraphs were composed to include topic sentences and transitions, in addition to facts relevant to the thesis statement. All aspects were interactive and participants came up with all sentences used. The researcher helped fine-tune as required (largely in the form of questions), but the onus was on the participants to brainstorm and come up with the sentences that would make up each paragraph.

The culminating part of Lesson 3 was pulling everything together. The goal was show participants how they could use the outline as a template to organize their research and thoughts until they felt comfortable doing so without using such a structured tool. The researcher modeled how simply removing the template parts resulted in a well-written organized, research-based science paper. As Lesson 3 ended, participants were informed that the next part of the intervention would involve proofreading and editing.

Lesson 4

> *I used what I learned to write my college essays. I know that's not really the same, but I just felt better about my essays than I would have before.*

Lesson 4 provided an opportunity to model how to test the goals set, self-edit part of the research paper, and use the Editing Checklist and MLA Checklist they were provided (see Appendix I). All participants were provided with a copy of the group-completed paper and the two checklists. After watching me proofread and edit part of the paper and listening to my thought processes verbalized, participants spent time on

proofreading and editing. Following the independent proofreading and editing, we worked together to correct and edit the final product. At the end of the lesson, a discussion was facilitated during which the pros and cons of proofreading and editing were discussed, as well as the value of outside editors in the form of peers and adults. The goal was to help participants conclude that there are no cons to proofreading and editing and that the tasks are worth the time and effort if they want to produce quality written products. At the conclusion of Lesson 4, participants were told that the final lesson, Lesson 5, would involve group practice of all that we had covered, with guidance and help from me.

Lesson 5

Excerpt of an email received from participant several months following the intervention: "I have just received my first college paper back and am very happy with the grade I got. I would like to thank you for the writing class you taught us last year because it helped me out significantly as a writer."

Prior to Lesson 5, pairs were determined based on observations of ability, self-regulation, behavior, and teacher input. The goal was to have participants work with partners that would be most conducive to the goal of Lesson 5—to use the PLANTOS strategy to write a science-based research paper from start to finish. The activity was completed in a computer lab and students had access to all required resources and technology. During this final phase of the intervention, I was highly involved, fielding questions, asking questions, keeping students on task, and providing help as needed. During the pilot study, it was apparent that it would be up to me to initiate interaction with all of the participants on multiple occasions to ensure they were on track. Each

group was handed an assignment and a rubric. The assignment included multiple topics related to class curricula to choose from in an effort to provide a wide variety of subjects in which participants might have an interest. In addition, participants were provided with a list of transition words (see Appendix I) to help them. During the independent practice, I provided verbal feedback to all students at every step of the process. When the research papers were completed, all parts of the process were handed in. In addition to the hard copy, each paper was submitted to an online originality filter.

Data Analysis

The study employed a mixed methods approach using quantitative and qualitative methods of data analysis. Each methodology of analysis is explained below.

Quantitative

Descriptive statistics were run on demographic information. Survey data were analyzed after time 1 using descriptive statistics and again after times 2 and 3 using repeated measures to see if there were differences in results. Pre-test and post test results were evaluated using a paired sample *t*-test. All quantitative data were analyzed using the SPSS 10.0 software program**.** The researcher was looking for significant changes in perceptions of writing self-efficacy, writing apprehension, as well as writing quality following the writing intervention.

Qualitative

Prior to conducting the semi-structured interviews, the researcher created a list of what Miles and Huberman (1994) referred to as start codes. Start codes were based on data from the earlier phases of the study. Doing so helped connect the research questions

and conceptual framework to the data collected. Codes were refined on an ongoing basis to ensure all codes were applicable to the study, were sufficiently concrete, and relevant (Miles & Huberman, 1994). Creswell (2003) suggested six generic steps to data analysis which start broad and descriptive and allow for streamlining and more refined analyses. It was logical to start broad to minimize the chances of inadvertently discarding valuable data. After organizing and preparing all data for analysis, the researcher read through it all (Maxwell, 2013) and looked for themes that emerged and refined start codes to include additional codes or eliminate redundant or irrelevant ones.

It is well established that memos are an important aspect of the research process at all stages, including data analysis (Maxwell, 2013; Miles & Huberman, 1994). Maxwell (2013) stated that memos are one of the most important means by which to help one make sense of one's topic, from start to finish. Memos have been described in multiple ways, from a brief note made in a researcher's notebook to an analytic essay (Maxwell, 2013). No matter the form, memos can and did serve as an effective way to interact with the research study on an ongoing basis. Therefore, as data were analyzed, memos were written multiple times. This facilitated the ability to think analytically about the data and presented the possibility of seeing beyond what was immediately obvious in the data, as well as the opportunity to make connections that were not explicit in nature.

Coding was conducted on an ongoing basis using basic pencil and paper methods, along with multiple highlighters, as well as Microsoft Word. Tables were used as appropriate, many of which are presented in this dissertation. Findings were represented

initially in handwritten memos, followed by descriptive tables, and finally on tables (Miles & Huberman, 1994).

In addition to the data gathered during the microanalytic assessments and informal observations, a researcher's notebook was kept, in which observations and quotes from participants were recorded. It was noted during the pilot study that several participants, 10 of the 11 participants, made comments about the intervention and how it helped them in various ways. This information was invaluable as it represented the feelings, thoughts, and intentions of participants often discovered in interviews (Patton, 2002), but in this case provided without any prompt from the researcher whatsoever. It seems these candid moments are essential to analyze in order to fully address the research questions. That being said, all field notes, similar to the interview data, were coded and reported appropriately using pencil and paper and tables in Microsoft Word. Themes were connected to original research questions as appropriate and new themes were explored and reported upon.

An essential feature of microanalysis involves data analysis (Cleary, 2011). Since surveys were given, all microanalytic assessments were comprised of open-ended questions. Coding was facilitated through the use of a scoring manual, which was developed from the literature and a list of what Miles and Huberman (1994) referred to as start codes. Start codes were based on data from the earlier phases of the study and constructs of interest. Each construct was color-coded to help see themes and patterns that emerged. Doing so helped connect the research questions and conceptual framework to the data collected. Codes were refined on an ongoing basis to ensure all codes were

applicable to the study, were sufficiently concrete, and relevant (Miles & Huberman, 1994).

Validity and Reliability

To further enhance validity and in order to address all aspects of the research questions, both quantitative and qualitative methods were used to make conclusions. The use of multiple data sources to address the questions increased the accuracy and thus quality of the findings. Tashakkori and Teddlie (1998), who have written extensively about mixed methods, encouraged researchers to use validity procedures for both the quantitative and the qualitative phases of the study. Validity in mixed methods research is defined by Creswell and Plano Clark (2011) as "employing strategies that address potential issues in data collection, data analysis, and the interpretations that might compromise the merging or connecting of the quantitative and qualitative strands of the study and the conclusions drawn from the combination" (p. 239).

Regarding quantitative threats to validity, Creswell (2003) encouraged researchers to take the necessary steps to address issues of about an experimenter's ability to conclude that an intervention affected an outcome. Specifically, researchers should address questions of internal and external validity. Internal validity threats refer to the researcher's ability to draw conclusions from a study and comprise issues such as: experimental procedures, treatments, and participants' experiences. External validity threats may occur when researchers make inaccurate inferences from the sample data and for example attempt to inappropriately generalize findings to other groups. In addition, researchers must address statistical conclusion validity. This occurs when researchers

interpret the data incorrectly due to a lack of statistical power or the violation of statistical assumptions. Finally, researchers should address construct validity or there are insufficient definitions and measures of variables (Creswell, 2003).

Maxwell (2013) defined validity as regarding qualitative research design as, "the correctness or credibility of a description, conclusion, explanation, interpretation, or other sort of account" (p. 122). It is believed both criteria were achieved in this study. Two types of bias that must be addressed in qualitative research are researcher bias and reactive bias (Maxwell, 2013). While it is not plausible to remove researcher bias from any study, it is specifically not intended by qualitative researchers; it is important for readers to have an understanding of where the researcher is coming from and how his or her personal values and/or expectations may have influenced outcomes of a study. Reactivity refers to the influence of the researcher on the setting or participants in a study. It is important for researchers to address reactivity, not in order to eliminate the phenomena, but to understand it and use it in a positive way (Maxwell, 2013).

Quantitative Validity

To ensure the instruments measured what they were intended to measure, or that the content and construct validity was acceptable, validity was a priority. For the writing self-efficacy survey, with content validity in mind, items were selected from surveys which were adequately tested in the past. As mentioned above, further analysis was conducted on the SEWS, confirming all instruments were valid. Modifications to questions were made only to ensure that survey items measured constructs being evaluated, in this case, those specific to the research paper genre. Committee members

and the consultants from the Educational Research Methodology Department in the School of Education were consulted for further advice. The Writing-Apprehension Test (Daly & Miller, 2013) was not altered from its original 1975 version (Daly & Miller, 1975). However, both instruments were evaluated using Cronbach's α coefficient. The pretest and posttest assessments were also evaluated for content validity. Since essay tests may be prone to a level of subjectivity, even with a scoring rubric, pretest essays were scored by an outside evaluator.

Qualitative Validity or Trustworthiness

Given that this was a mixed methods study with a qualitative component, it was important to address validity or trustworthiness (Creswell & Plano Clark, 2011; Maxwell, 2013). According to Merriam (1998) and Schram (2006), the foremost assumption in qualitative research is the belief that reality is constructed through social interactions between individuals. Creswell (2003) sees validity as a strength of qualitative research, being used to ascertain if findings are accurate from the researcher's, participant's or reader's perspective. The literature suggests different methods for addressing validity in qualitative studies, Creswell (2003) referencing eight primary methods and Maxwell (2013) promoting a validity checklist. From these sources, there is crossover, and the four processes used to address validity in the qualitative phase of the study were: triangulation, rich data, clarification of researcher bias, and searching for negative or discrepant evidence.

Triangulation

Through the use of multiple sources, data were triangulated. The purpose of this was to corroborate or discount any findings or patterns that emerged. In order to do this, the data from the surveys, microanalytic assessments, informal observations, and the researcher's notebook were used. Triangulation should reduce the risk of self-report bias through the promotion of improved assessment of findings (Creswell & Plano Clark, 2011; Maxwell, 2013). It was believed that through using both quantitative and qualitative data that the findings of this mixed methods study were strengthened. Triangulation was further used to enhance the findings of the study by providing the opportunity to discuss discrepant findings between the qualitative and the quantitative data.

Rich Data

In the qualitative phase of this mixed methods study, rich, thick description (Patton, 2002) was collected through the microanalytic assessments and the informal observations. Such data provided the foundation for analysis and reporting, and helped support the accuracy of the findings (Creswell, 2003). Rich data provided detailed descriptions of what students felt they learned from the intervention and how such sentiments reflected or contradicted those articulated on the writing self-efficacy and writing apprehension surveys.

Clarification of Researcher Bias

Although surveys and statistical analyses were used, there is no escaping that all data gathered during qualitative aspects of the study were interpreted through the

researcher's lens, which is situated within my own specific historical and cultural circumstances (Creswell, 2003). Given this assumption, I understand the reality that my interpretation is not the only one possible and that other interpretations and conclusions of the data are a possibility (Schram, 2006). All research should be conducted with an end goal or generating valid and reliable results (Merriam, 1998), and it is not uncommon for qualitative methods to be susceptible to questions surrounding trustworthiness (Maxwell, 2013). Contrary information such as insignificant findings were not avoided, but discussed.

Searching for Negative or Discrepant Evidence

It is not uncommon for discrepant findings to emerge from the quantitative and qualitative data, thus an ongoing search for discrepant evidence was carried out. Since issues in education are so complex and involve multiple aspects, it is not only possible, but probable that differing perspectives will emerge. Discussing contrary information can add to the credibility of a study and assess whether modifications of conclusions are necessary (Creswell, 2003; Maxwell, 2013).

Every effort was made to encourage students to answer questions on the self-efficacy and apprehension scales thoughtfully and honestly, as well as on the microanalytic assessments. However, when working with adolescents there is always a risk that they will answer in a way they perceive is expected by the researcher, will enhance their social status, or alternatively, they will do so simply to get through the exercise as quickly as possible.

Limitations and Generalizability

All studies have limitations and in all research that is subject to interpretation, researchers are encouraged to make known potential biases, values, or personal interests or conflicts (Creswell, 2003; Maxwell, 2013) and to be committed to maintaining the integrity of the study (Schram, 2006). For this reason I will address my positionalities. Since I have been a presence at the research site for more than eight years, the study may be open to criticism as "Backyard" research (Creswell, 2003). That being said, it is important to note that in my current position as an independent contractor, I do not have the opportunity to interact with most participants outside of the research scenario and there are no power relationship issues as I do not provide grades for any students at the school. I understand the importance of researcher presence and maintaining the integrity of a study (Schram, 2006). I approached this study from a position of integrity as I implemented the intervention. I have high regard and respect for the teachers with whom I worked and I approached this study as an educator with a passion for making a difference in the writing outcomes of students, many of whom have failed to receive adequate instruction in writing (Applebee & Langer, 2013). Although I do have highly positive feelings regarding all students, I did not feel overly optimistic about their writing performances and had concern about their abilities to thrive in the college setting; one which will likely have more writing demands.

While it is believed that this intervention study has the potential to be a valuable tool for educators in similar contexts, it is acknowledged that the intervention would require modification based on students' needs in order to be used in more diverse

settings. The results cannot be generalized to a wider population, but the intervention could be replicated in classrooms within the school in which the study was being conducted. Although the pilot study was conducted using a small sample (n = 11), it was noted that participants benefited from the personal nature of the intervention, especially given that the researcher was a visitor in a teacher's classroom. It is firmly believed that this intervention could be conducted in classroom settings by teachers who have an established rapport with students, combined with the power of assessing students for grades. Given the lack of a control group, all such claims should be regarded with appropriate caution.

CHAPTER IV

RESULTS

Introduction

This study sought to investigate the effects of a writing intervention designed to improve high school students' self-efficacy for writing science research papers, reduce anxiety related to writing, increase the use of self-regulatory strategies, and as such improve the quality of science research papers. The purpose of this study was achieved by examining participants' scores in pre and post writing assessments, participants' writing self-efficacy and writing apprehension across three time points, combined with five dynamic microanalysis assessments and two informal observations to target specific thoughts and behaviors at specific time points during the study. This chapter summarizes first, the results of quantitative data analysis, and second, qualitative data analysis for the four research questions:

1. How efficacious are high school students in upper grade science classes about writing research papers before, during, and after a writing intervention?
2. How apprehensive are high school students in upper grade science classes when writing research papers before, during, and after a writing intervention?
3. How do they perform when writing research papers before, during, and after a writing intervention?

4. Can a writing intervention with a motivational component increase student writing self-efficacy, reduce student writing apprehension, increase the use of strategies when writing research papers, and improve the quality of research papers?

Descriptive statistics are reported first. Next, results of an ANOVA test of repeated measures and a paired sample *t*-test examining participants' writing self-efficacy across three time points are provided to address research question one, "How efficacious are high school students in upper grade science classes about writing research papers?" and the first part of research question four, "Can a writing intervention with a motivational component increase student writing self-efficacy, reduce student writing apprehension, increase the use of strategies when writing research papers, and improve the quality of research papers?" In order to address research question two, "How apprehensive are high school students in upper grade science classes when writing research papers?" and the second part of research question four (see above), results of an ANOVA test of repeated measures and a paired sample *t*-test examining student writing apprehension across three time points are summarized. Research question three and the third part of research question four regarding the ability of the intervention to positively impact the quality of research papers is addressed in a summary of results of a paired sample *t*-test comparing student pre and posttest scores. Research question four is again addressed in the analysis of the qualitative data, which is presented in a separate section.

Quantitative Results

Demographic Variables

Demographic information captured included age, gender, ethnicity, current grade level, class level, and grades achieved in English class during the prior school year. The above referenced variables are presented in Table 2.

Table 2

Demographic Information

Variables	Frequency	Percent	Cumulative Percent
Age			
15	2	5.9	5.9
16	5	14.7	20.6
17	12	35.3	55.9
18	15	44.1	100.0
Total	34	100.0	
Gender			
Male	19	55.9	55.9
Female	15	44.1	100.0
Total	34	100.0	
Ethnicity			
Caucasian	32	94.1	94.1
Hispanic	1	2.9	97.1
Asian	1	2.9	100.0
Total	34	100.0	
Current Grade			
9	1	2.9	2.9
10	2	5.9	8.8
11	10	29.4	38.2
12	21	61.8	100.0
Total	34	100.0	

Table 2

(Cont.)

Variables	Frequency	Percent	Cumulative Percent
Class Level			
CP	26	76.5	76.5
Honors	3	8.8	85.3
AP	5	14.7	100.0
Total	34	100.0	
Semester I Grade			
A	10	29.4	29.4
B	17	50.0	79.4
C	6	17.6	97.1
D	0	0.0	97.1
F	1	2.9	100.0
Total	34	100.0	
Semester II Grade			
A	12	35.3	35.3
B	14	41.2	76.5
C	7	20.6	97.1
D	0	0.0	97.1
F	1	2.9	100.0
Total	34	100.0	

Testing the Research Questions

Parametric statistics were used to investigate the research questions posed in this study. All data sets used for *t*-tests met the tests for normal distribution with the exception of test for skewness for SEWS at Time 3 which was non-normally distributed with skewness of -2.63 (*SE* = 1.24) and kurtosis of .467 (*SE* = .788). The results for Time 3 should be viewed with caution. To investigate the first research question regarding writing self-efficacy, an ANOVA test of repeated measures was run (see Table

3), followed by a paired sample *t*-test to examine participants' writing self-efficacy and the effects of feedback on an intervention. A one-way within subjects ANOVA was conducted to compare the effect of feedback and the intervention on participants' writing self-efficacy over the three times. There was a significant effect on participants' writing self-efficacy. Since the error of variance across the three time points was significant, sphericity, according to Mauchly's Test of Sphericity, could not be assumed. The Greenhouse-Geisser test of within subject effects was used for further analysis. To follow up on this statistically significant result, a paired sample *t*-test was calculated.

Table 3

Analysis of Variance—SEWS

df	*F*	η	*p*
2	172.8	0.84	0**

** $p < .01$

Results of the two-tailed paired sample *t*-test (see Table 4) supported the hypotheses that participants' writing self-efficacy would drop following feedback on the pretest (i.e., from Time 1 to Time 2) and would rise following the intervention (i.e., from Time 2 to Time 3 and/or Time 1 to Time 2). These results suggested participants' writing self-efficacy was impacted by feedback and by the intervention. Participants, who may have felt efficacious about their abilities to write a research paper on a science related topic, felt less efficacious following feedback on a pretest and more efficacious following an intervention designed to teach them how to write quality research papers on a science related topic.

Table 4

Paired Sample *t*-test—SEWS

	M	*SD*	*t-test*
Time 1 to Time 2	22.24	16.00	.000**
Time 2 to Time 3	43.32	13.66	.000**
Time 1 to Time 3	21.1	10.56	.000**

** $p < .01$

To investigate the second research question and the second part of the fourth research question regarding writing apprehension, a repeated measures ANOVA was run, followed by a paired sample *t*-test to examine participants' writing apprehension and the effects of feedback and an intervention. A one-way within subjects ANOVA was conducted to compare the effects of feedback and the intervention on participants' writing apprehension over the three times (see Table 5). There was a significant effect on participants' writing apprehension. Mauchly's Test of Sphericity indicated the error of variance across the three times was not significantly different, hence sphericity was assumed. Given a statistically significant result, a paired sample *t*-test was then calculated.

Table 5

Analysis of Variance—WAT

df	*F*	η	*p*
2	18.54	0.36	0**

** $p < .01$

Results of the two-tailed paired sample *t*-test (see Table 6) failed to support the hypothesis that participants' writing apprehension would increase following feedback on the pretest (i.e. from Time 1 to Time 2), but did support the hypothesis that writing apprehension would drop following the intervention (i.e. from Time 2 to Time 3 and Time 1 to Time 3). There was no significant difference in the scores from Time 1 to Time 2. There was a significant difference in the scores from Time 2 to Time 3. Additionally, there was a significant difference in the scores from Time 1 to Time 3. These results suggested participants' writing apprehension was not impacted by feedback, but was impacted by the intervention. Participants, who may have felt apprehensive about their abilities to write a research paper on a science related topic, felt less apprehensive following an intervention designed to teach students how to write such papers and how to manage anxiety and other issues during the research and writing process.

Table 6

Paired Sample *t*-test—WAT

	M	*SD*	*t-test*
Time 1 to Time 2	0.86	11.1	0.657
Time 2 to Time 3	10.18	10.45	.000**
Time 1 to Time 3	9.32	10.86	.000**

** $p < .01$

Research question three and the third part of research question four regarding the ability of the intervention to positively impact the quality of research papers was

addressed with a paired sample *t*-test comparing student pretest and posttest scores (see Table 7). There was a significant difference in the scores from pretest and posttest, to posttest. These results suggested that participants wrote higher quality research papers following the intervention.

Table 7

Paired Sample *t*-test Pretest to Posttest

	M	*SD*	*t-test*
Pretest	55.47	13.38	.000**
Posttest	79.65	10.02	.000**

** $p < .01$

Quantitative results suggested participants' writing self-efficacy was positively impacted by feedback and the intervention. Results also demonstrated that although writing apprehension was not impacted by feedback, participants' writing apprehension was reduced following the intervention. Finally, the quality of research papers, as indicated by an increase in mean scores, was significantly impacted by the intervention.

Qualitative Results

Prior to creating the microanalysis instruments, five themes were selected for investigation: writing self-efficacy, writing attributions, goals, strategy choice, and attributions. All microanalysis questions were intended to probe participants' thoughts on one or more of these themes. To supplement the surveys and to probe additional constructs targeted in the intervention, microanalysis assessments were administered at four different time points, before, during, and after the intervention. All microanalysis

instruments were analyzed in a similar manner. After reviewing the data and writing memos, start codes were identified based on student responses. Codes were refined on an ongoing basis to ensure all codes were applicable to the constructs under study, were sufficiently concrete, and relevant (Miles & Huberman, 1994). In addition, information from two informal observations is presented. The first observation occurred during the pretest and the second occurred during the posttest.

Microanalysis 1

I feel confident because I think I know what I am doing.

Microanalysis 1 consisted of six questions and was administered at the beginning of the study. The goal of this assessment was to gather information on students' beliefs prior to the pretest regarding their plans and goals for writing the pretest essay. Question 1, "How self-confident do you feel in your ability to write a research paper on a Marine Science or a Zoology topic? Why do you feel that way?" was asked to target feelings of self-efficacy prior to the pretest on writing at the onset of an intervention study designed to increase writing self-efficacy (see Table 8). Initial and subsequent analyses using memos, tables, color coding, and Microsoft Excel revealed that 20 (59%) of the 34 participants indicated that they felt confident, three (9%) indicated they did not feel confident, and four (12%) that they felt adequately confident. Reasons for such feelings mentioned included: depends on the topic, which 24 (71%) of the participants referenced in some form, confidence in writing skills referenced by nine (26%) of the participants, lack of writing skills, referenced by five (15%) of the participants, and not liking to write,

referenced by three (9%) of the participants. Overall, analyses of question 1 revealed that the majority of participants felt self-efficacious about their abilities to write the pending research paper on a science related topic.

Table 8

Question 1: How Self-confident Do You Feel in Your Ability to Write a Research Paper on a Marine Science or Zoology Topic? Why Do You Feel That Way?

Response	*n*	Percent
Confident	20	59
Not confident	3	9
Depends on topic	11	32
Positive about topic	3	9
Lack knowledge of topic	5	15
Interesting	5	15
Lack writing skills	5	15
Have writing skills	9	26
Don't like to write	3	9
Capable	2	6
Adequate	4	12

Question 2, "Do you have any specific plans on how you will write this research paper? Can you tell me about them?" was asked to ascertain what, if any strategies participants planned to use during the pretest (see Table 9). While 14 (41%) of the participants indicated they had no plans, 17 (50%) suggested they did have plans. Strategies referenced included: making an outline (n = 17; 50%), conducting research (n = 21; 61%), generating a thesis or an argument (n = 4; 12%), and revision (n = 2; 6%). Twenty participants (59%) referenced strategies they planned to use, and the other 14

(41%) stating they planned to use no strategies, some suggesting they would "just wing it" (*n* = 7; 21%), others stating they just planned to do their best (*n* = 2; 6%). No participants provided a strategy for writing a research paper from start to finish.

Question 3, "Do you have a goal when writing a research paper? If so, what is it?" was asked to ascertain if participants had goals prior to beginning the pretest and to ascertain what type of goals they set (see Table 10). Only three participants (9%) indicated they had no goal. The remaining 31 (91%) participants had goals which included: getting a good grade (*n* = 13; 38%), learning or teaching (*n* = 9; 26%), meeting the assignment requirements (*n* = 5; 15%), writing a good quality paper (*n* = 5; 15%), and just getting it done (*n* = 5; 15%). For the most part, participants had goals prior to beginning the pretest.

Table 9

Question 2—Do You Have Any Specific Plans on How You Will Write This Research Paper? Can You Tell Me About Them?

Response	*n*	Percent
No plans	14	41
Make Outline	15	44
In steps	2	6
Do my best	2	6
Have Plans	17	50
Gather info/research	21	62
Revise	2	6
Wing it	7	21
Note Cards	1	3
Thesis Statement/Argument	4	12
Process Defined	4	12

Table 10

Question 3—Do You Have a Goal When Writing a Research Paper? If So, What is it?

Response	*n*	Percent
No Goal	3	9
Get Good Grade	13	38
Have Goal	30	88
Get Done on Time	1	3
Meet Requirements	5	15
Get Better at Writing	1	3
Prove Thesis	4	12
Quality	5	15
Learn/Teach	9	26
Answer Question	1	3
Over and Done With	4	12

Question 4, "What do you need to do to accomplish that goal?" was asked to see if participants had a strategy in mind to accomplish stated goals (see Table 11). All but two participants referenced something they defined as a strategy, with the remaining two participants giving no response. The most common strategy mentioned involved the collection of research (*n* = 18; 53%). While there were no other strikingly similarities across participants with reference to strategies, participants did reference a desire to stay on task, focus, follow instructions, and get motivated. Three participants made responses which were irrelevant to writing.

Table 11

Question 4—What Do You Need to do to Accomplish That Goal?

Response	*n*	Percent
Nothing Noted	2	6
Conduct Research	18	53
Prepare/Plan	2	6
Get Motivated	2	6
Stay on Task/Focus	3	9
Get Help/Skills	2	6
Write a Good Paper	3	3
Follow Instructions	2	6
Make Good Outline	1	3
Dedicate Time	3	9
Nothing related to writing	3	9
Revise	1	3
Good Arguments	1	3

The goal of question 5, "How do you feel after you receive a grade for a research paper and why?" was posed as a way to explore writing apprehension and attributions (see Table 12). Twenty-six participants (76%) indicated that the way they felt depended on the grade they received, with good grades resulting in positive feelings and grades perceived to be "bad" resulting in negative feelings. Three participants (9%) indicated that they do not care about what grade they get on a research paper. Three (9%) participants attributed their feelings to being, "glad it's over" and 3 (9%) indicated that their feelings about their grades were dependent on a combination of the grade and how hard they felt they worked. The majority simply attributed their feelings to what grade they received.

Table 12

Question 5—How do You Feel After You Receive a Grade for a Research Paper and Why?

Response	*n*	Percent
Depends on grade	26	76
Depends on how hard worked	3	9
Don't Care/Indifferent	1	3
Confident if grade good	1	3
Glad it's over	3	9
Good if did best could	1	3
Accomplished	1	3
Like not know much about writing	1	3
Surprised if good	1	3
Bad	1	3

Question 6 (see Table 13) "What grade (in percent) will you set as your goal for this pretest?" was asked to help ascertain if students were thinking about a goal for a grade and to get an idea of how self-efficacious they were about their abilities to perform well on the pretest. While not all students noted responses in percentages as requested, 32 students set their goals in the A range (n = 10; 29%) or the B range (n = 22; 65%). The remaining two participants (6%) indicated they set their goals in the C range. Responses from this question indicated all students were confident they had the ability to do well on the pretest and that they had a goal in mind.

Table 13

Question 6—What Grade (in Percent) Will You Set as Your Goal for This Pretest?

Response	*n*	Percent
A	10	29
B	22	65
C	2	6

Microanalysis 1 revealed that most participants felt confident in their abilities to write a quality research paper on a science-related topic and that they had some sort of plan in place, although plans mentioned typically referenced only one aspect of the writing process. The majority of goals referenced obtaining a good grade and that in order to achieve this goal, research was believed to be a necessary ingredient. Most participants indicated they expected to achieve a grade of a B, with several also predicting they would make an A. No participants indicated a belief they might receive a failing score on the pretest.

Informal Observation 1

The above results are interesting when considered along with informal observations made during the pretest (see Table 14). Prior to the pretest, a list was made of strategies participants had listed as plans they intended to use while completing the pretest. Five categories were identified and three other categories emerged during the observations. The categories identified included: make an outline, conduct research, make notes, proofread/edit, and make note cards. Other categories that emerged during the observations were: read directions, read rubric, and split computer screen. During the

pretest, one participant was observed making an outline. All participants were observed conducting research, while no participants were observed making note cards. Finally, seven participants (21%) were observed proofreading and/or editing. Of the categories that emerged, five participants (15%) were observed looking at the directions, while three (9%) were observed looking at the rubric. These observations were interesting given that participants were asked to do both prior to beginning the pretest. Eleven (32%) of the participants were observed to have split their computer screens and appeared to be summarizing directly from websites.

Table 14

Observation 1

Response	*n*	Percent
Make Outline	1	3
Do Research	33	97
Make Notes	20	59
Revise/Edit	7	21
Note Cards	0	0
Directions	5	15
Rubric	3	9
Split Screen/Summarize	11	32

Despite indicating plans, few participants were observed carrying out plans mentioned in microanalysis 1 and several participants were observed writing their papers by paraphrasing directly form websites. No participants indicated their intentions to do this in microanalysis 1. Overall, behaviors noted did not reflect the likelihood of earning a high score on the pretest.

Microanalysis 2

I have never really been taught how to write a research paper before.

Microanalysis 2 consisted of three questions and was administered to participants soon after they received pretest scores and feedback. The goal of this assessment was to gather information on participants' beliefs following feedback on the pretest and capture their thoughts on their performance, their attributions for said performance, and to see if and how feedback impacted goal setting and strategy use in similar, future writing scenarios. Question 1, "How does the grade you received on the pretest compare with the goal you predicted" was asked to obtain information on comparative predicted and actual scores (see Table 15). Twenty-nine (85%) of the 34 participants indicated that the score received was lower than the score predicted. Four participants (12%) indicated the score received was about what they predicted, and one participant did not indicate a goal.

Table 15

Question 1—How Does the Grade You Received on the Pretest Compare with the Goal You Predicted?

Response	*n*	Percent
Lower than Expected	29	85
What I expected	4	12
No Goal	1	3

Question 2, "If different, why do you think there was a difference?" was asked to help identify attributions ascribed by participants for pretest performance (see Table 16).

Participants identified issues which included attributes representing both the external and internal locus dimension. Five themes emerged that were categorized as external. Eight participants (33%) attributed their scores being lower than expected to the evaluator, indicating the pretest was graded more harshly than they expected. One participant stated that the assignment was more difficult than anticipated and three participants (9%) suggested low scores were due to context (i.e., a preference to write at home or in their bedrooms). Four (12%) participants suggested low scores reflected insufficient time allocated for the assignment, and one participant disagreed with the score given.

Table 16

Question 2—If Different, Why Do You Think There was a Difference?

Response	*n*	Percent
Graded Harder	8	33
Lack of Effort	4	12
Off Topic/Thesis issue	4	12
Formatting/Citations Issues	3	9
Harder than Expected	1	3
Careless Errors	4	12
Lack Writing Skills	4	12
Failure to Proofread/Edit	4	12
Context/Setting	3	9
No Planning	1	3
Insufficient Time	4	12
Disagree with Score	1	3
Not read rubric well	1	3
Nothing Noted	3	9

Nine themes emerged from participant responses indicating internal attributions. Four participants (12%) attributed scores to insufficient effort. Four participants (12%) attributed being off-topic as a reason for lower than expected scores, while three (9%) identified failure to include or issues with parenthetical citations, and four (12%) attributed failure to address careless errors as a basis for low scores. Lack of writing skills was noted as an attribution for poor performance by four (12%) of the participants and four (12%) of the participants also indicated a failure to proofread and/or edit their work as attributing to low scores. One participant indicated a failure to plan as contributing to a low score, while another noted a failure to read the rubric. Three (9%) of the participants chose not to provide any attributional information. The final question on this microanalytic assessment, "If you could take this pretest again, what, if anything, would you do differently?" was designed to ascertain if and to what extent performance would have an impact on future behavior and whether or not a feedback loop was activated (see Table 17). Eleven themes emerged which suggested the activation of a feedback loop for most participants. Five participants (15%) elected not to provide a response. Nine participants (21%) indicated that to do it again, they would proofread and/or edit their work. Seven participants (21%) suggested they would include citations, while 5 (15%) indicated they would attend to format and/or style issues. Topics related to organization, planning, and time management were noted by 7 (21%) of the participants and 4 (12%) suggested they would focus more. Four participants (12%) suggested they would read the rubric and 2 (6%) referenced issues related to improving

the thesis statement. Two participants (6%) indicated they needed help with writing skills and one participant said he or she would care more.

Microanalysis 2 revealed that participants, for the most part, received scores which were lower than they had anticipated. The majority of participants attributed low scores to internal attributions, or issues over which they exert control. From the data, it was apparent a feedback loop was activated—participants indicated plans to alter their approaches based on the feedback provided to them in order to achieve superior outcomes.

Table 17

Question 3—If You Could Take This Pretest Again, What, if Anything, Would You Do Differently?

Response	*n*	Percent
No Response/Nothing	5	15
Include Citations	7	21
Focus More	4	12
Organize/Plan	5	15
Proofread/Edit	9	26
Manage Time Better	2	6
Improve Thesis	2	6
Attend to Format Issues	5	15
Attend to Writing Style	1	3
Write a well-developed paper	2	6
Select different topic	1	3
Work on Writing Skills	2	6
Do on own terms	1	3
Care More	1	3
Make it Flow Better	4	12
Attend to Rubric	4	12

Microanalysis 3

We plan to correct our paper to make it even better!

Microanalysis 3 consisted of three questions, two of which had two parts, and was administered to participants during independent practice following the intervention. The goal of this assessment was to gather information on participants' fine-grained behaviors during the writing process following feedback and instruction and to see if and how feedback impacted strategy use and goal setting. In short, the purpose of this assessment was to see if and how participants' behaviors while writing a research paper were altered as a result of the intervention. Question 1, "Can you please stop for just a second and tell me what you were doing just now and why?" was asked to define exactly what participants were doing at a specific time point during the writing process (see Table 18).

Although participants were at different places in the writing process due to individual differences, in response to the first part of the question, all participants, with exception of one, provided responses that indicated they were in fact engaging with an aspect of the writing process taught during the intervention. The remaining participant stated that he or she was "typing." Ten behaviors were identified by participants: editing, paraphrasing research, working on an outline, making note cards, improving a paragraph, conducting research, proofreading, sticking to goals, writing a topic sentence, and converting an outline to a paper. Specifically, nine participants (26%) indicated they were working on an outline, 12 (35%) that they were improving a paragraph, and ten (29%) that they were converting outlines to papers. Thirteen participants (38%) also

indicated they were interacting with research in some capacity. Three participants (9%) were further along in the writing process, either proofreading or editing.

Table 18

Question 1, P1—Can You Please Stop for Just a Second and Tell Me What You Were Doing Just Now?

Response	*n*	Percent
Editing	2	6
Paraphrasing research	3	9
Outline	9	26
Note cards	5	15
Improving/work paragraph(s)	12	35
Research	5	15
Proofreading	1	3
Sticking to goals	1	3
Topic sentence	1	3
Typing	1	3
Converting outline to paper	10	29

Part 2 of question 1 was asked in order to ascertain the motivations of participants' behaviors (see Table 19). In other words, why were they doing what they were doing? Were they engaged in activities and/or behaviors due to the perceived value they felt such behaviors brought to the writing process, or because they felt they should engage in such activities since they were covered during intervention? Only one participant provided an answer that did not suggest definitive information on the value they placed on what they were doing, simply stating, "to get it done." Ten participants (29%) indicated what they were doing was designed to help with organization, 21

participants (62%) stated that what they were doing was intended to target a specific paragraph. Nine participants (26%) indicated they were organizing research. Other reasons given for actions included to catch errors, to improve the paper, working on a thesis statement, and wanting to turn outlines into papers.

Table 19

Question 1, P2—Why?

Response	*n*	Percent
Catch/Fix Errors	3	9
Help with Organization	10	29
Make Easier to put info in essay	4	12
Improve paragraph	6	18
Thesis	2	6
Avoid Plagiarism	1	3
Turn Outline into Paper	2	6
Organize Research	5	15
Improve Paper	2	6
Working on specific paragraph	15	44
Get it Done	1	3

Question 2, like question 1, was comprised of two parts, “Is this something that you typically do when writing a research paper? If yes, please explain. If not, what do you typically do?” and was asked to provide insights into whether what students were doing at the time differed from their typical writing behaviors (see Table 20). Seventeen participants (50%) indicated that they did not typically do what they were doing, 13 (38%) indicated they do, 3 (9%) said they do so, “sometimes,” and one said only when required.

Table 20

Question 2, P1—Is This Something That You Typically Do When Writing a Research Paper?

Response	*n*	Percent
Sometimes	3	9
When Required	1	3
No	17	50
Yes	13	38

Participants who indicated what they were doing was typical provided ten explanations for such actions: to review grammar 1 (3%), required 2 (6%), felt important to catch errors 2 (6%), to improve paragraphs 3 (9%), to learn about or teach about a topic 2 (6%), to help with organization 2 (6%), to avoid plagiarism 1 (3%), to be more efficient 2 (6%), to catch the reader's interest 1 (3%), and to back up and argument or thesis statement 2 (6%) (see Table 21).

Table 21

Question 2, P2—If Yes, Please Explain

Response	*n*	Percent
Review grammar only	1	3
When Required	2	6
Important to catch errors	2	6
Improve Paragraphs	3	9
Learn/Teach About Topic	2	6
Organization	2	6
Avoid Plagiarism	2	6
More Efficient	2	6
Get Reader's Interest	1	3
Back Up Argument/Thesis	2	6

Participants who indicated deviation from normal writing behaviors provided three explanations of what they typically do: just gather notes and write the paper from those 5 (15%), just write the paper 9 (26%), and write paragraphs straight from sources 3 (9%) (see Table 22).

Table 22

Question 2, P2—If Not, What Do You Typically Do?

Response	*n*	Percent
Gather notes and write from those	5	15
Just Write Paper at one time	9	26
Write Paragraphs Straight from Sources	3	9

Question 3 consisted of two parts, "What do you plan to do next and why?" and was asked to help gain insight as to whether participants were following a process and their reasons. Seven behaviors were identified in analyzing data regarding what participants planned to do next (see Table 23). These included: correcting mistakes 2 (6%), working on an outline 7 (21%), working on a conclusion 6 (18%), writing the paper 11 (32%), working on the Works Cited 2 (6%), working on the introduction 1 (3%), and pulling parts of the paper from the outline together 3 (9%).

The second part of question 3 (see Table 24) attempted to solicit information regarding participants' rationale for what they planned to do. In analyzing responses, three dominant motivating themes emerged, in addition to seven other less dominant themes. Ten participants (29%) indicated their actions were aimed at pulling everything together, while seven (21%) stated the reason for the next action was that is what they

were ready to do. Eleven participants (32%) stated their actions were intended to help complete the paper, while three (9%) stated they were attempting to make their papers more structured. Other motivations referenced included: to improve the paper 1 (3%), because it was assigned 2 (6%), to restate the argument 1 (3%), and to correct format 1 (3%).

Table 23

Question 3, P1—What Do You Plan to Do Next?

Response	*n*	Percent
Correcting Mistakes	2	6
Working on Outline	7	21
Working on Conclusion	6	18
Writing Paper	11	32
Fixing Works Cited/ Citations	2	6
Writing/Work Introduction	1	3
Putting parts together	3	9

Table 24

Question 3, P2—Why?

Response	*n*	Percent
Improve	1	3
Assigned	2	6
Provide all Info needed	1	3
Prepared to do It	7	21
To complete paper	7	21
Restate argument	1	3
Correct MLA	1	3
Wrap up/Finish	4	12
Make more structured	3	9
Pull it all together	10	29

During the independent practice phase of the intervention, the overwhelming majority of participants indicated they were using strategies and methods that were taught during the intervention. Reasons given for using such strategies indicated that participants felt such strategies were valuable and would improve the quality of their research papers. Several participants indicated the strategies they were using were new to them and it was apparent participants were using the strategies taught in the order they had been suggested.

Microanalysis 4

I actually learned to write for the first time in high school.

Microanalysis 4 consisted of four questions and was administered to participants prior to the posttest. The goal of this assessment was to gather information on participants' writing self-efficacy, attributions for such feelings, plans regarding the process, and goals they may have. Question 1, "How self-confident do you feel in your capability to write a research paper on a Marine Science/Zoology research paper?" elicited three responses: confident 27 (79%), I can't do worse 1 (3%), and better 6 (18%) (see Table 25). No participant indicated that they did not feel confident.

Question 2 (see Table 26), "Why do you feel that way?" prompted three main responses, all of which indicated growth in knowledge and feelings of knowing what to do. Ten additional responses were also interesting to note. Twenty-five participants (74%) suggested they felt confident because they knew what to do, while 17 (50%) stated they knew more than before. Finally, 18 participants (53%) stated that they planned to

use what they had learned. Other responses mentioned included: will watch for mistakes 2 (6%), will take things step-by-step 3 (9%), know what to expect 4 (12%), will read directions 3 (9%), will proofread and edit 1 (3%), was reminded of things 3 (9%), learned how to write a research paper for the first 3 (9%), things make more sense 1 (3%), not feeling as intimidated 1 (3%), and plan to make more of an effort or take more seriously 3 (9%).

Table 25

Question 1—How Self-confident Do You Feel in Your Capability to Write a Research Paper on a Marine Science/Zoology Research Paper?

Response	*n*	Percent
Confident	27	79
Can't do Worse	1	3
Better	6	18

Table 26

Question 2—Why Do You Feel That Way?

Response	*n*	Percent
I know what to do	25	74
Will watch for mistakes	2	6
Will take step by step	3	9
Know More	17	50
Know what to expect	4	12
Will read directions	3	9
Use what I learned	18	53
I will proofread/edit	1	3
I was reminded of things	3	9
First time I learned how to write a research paper	3	9
Things make more sense	1	3
Not as intimidated	1	3
Make more effort/ Take more seriously	3	9

Question 3, “Do you have any specific plans on how you will write this research paper?” indicated that all participants planned to take some deliberate action (see Table 27). Twenty participants (59%) indicated their intention to follow the steps they had learned, while nine (26%) stated their intention to edit and/or proofread their papers. Thirteen participants (38%) stated their intentions to make an outline, seven to make note cards while researching, and seven (21%) stated they intended to read the directions and the rubric this time. Four participants (12%) made reference to ensuring they followed MLA format. Other plans mentioned included: not being lazy 3 9%, not taking shortcuts 3 (9%), making a plan and following it 3 9%, working harder 1 (3%), doing research 3 9%, writing a solid thesis 2 (6%), and not stressing (*n* = 1; 3%).

Table 27

Question 3—Do You Have Any Specific Plans on How You Will Write This Research Paper?

Response	*n*	Percent
Follow Steps	20	59
Not be Lazy	3	9
Not take shortcuts	3	9
Make a plan and follow it	3	9
Edit/Proofread	9	26
Read directions/Rubric	7	21
Make Note Cards	7	21
Work Harder	1	3
Do Research	3	9
Thesis	2	6
Not Stress	1	3
MLA	4	12
Be Organized	1	3
Outline	13	38

Question 4 (see Table 28), “Do you have a goal when writing this research paper?” prompted responses that primarily concerned performing better than on the pretest (n = 20; 59%) and/or getting a better grade (n = 16; 47%). Five participants (15%) stated their goal was to do the best they could, six (18%) mentioned they planned to do well as an opportunity to help them practice for AP tests or the SAT that was scheduled shortly after, and four (12%) stated their desire to show what they know. Other responses included: avoiding superficial errors 1 (3%), editing and/or proofreading 2 (6%), managing time better 1 (3%), focusing more 2 (6%), getting better at writing 2 (6%), writing a good thesis statement 1 (3%), not rushing 1 (3%), and building confidence 1 (3%).

Table 28

Question 4—Do You Have a Goal When Writing This Research Paper?

Response	*n*	Percent
Do Better	20	59
Get Higher/Good Grade	16	47
Avoid Superficial Errors	1	3
Do Best I can	5	15
Edit/proofread	2	6
Manage Time Better	2	6
Know I have Learned	1	3
Focus More	2	6
Get Better at Writing	2	6
Thesis	1	3
Not Rush	1	3
Build Confidence	1	3
Practice for AP/SAT/College	6	18
Show what I Know	4	12

Results from microanalysis 4 indicated that prior to the posttest, all participants felt confident in their abilities to write a research paper on a science related topic. Participants attributed such confidence to an increase in knowledge about the writing process and stated they intended to create and follow a deliberate plan while completing the posttest. The majority of participants articulated their intentions to use what they had learned during the intervention and had the goal of doing better than they had on the pretest.

Informal Observation 2

The above results are interesting when considered along with informal observations made during the posttest (see Table 29). Prior to the posttest, a list was made that included strategies participants had learned, strategies listed as plans they intended to use while completing the posttest, and tools participants had been provided with. Eleven categories were initially identified, but were later reduced to nine as there was some overlap. The categories identified included: read directions, read rubric, make note cards, research, make outline, proofread/edit, use easybib.com, use MLA checklist, and use the transitions list. No other categories emerged during the observation. All participants were observed reading the directions and the rubric on day one of the posttest. All participants were observed on at least one website relevant to their selected topics and all participants made note cards, which they subsequently handed in. All participants made an outline, a copy of which was handed in. All participants used the MLA checklist and all but one participant used the editing checklist. All but one participant used easybib.com and 26 participants (76%) were observed using the

transitions list that was provided. Results of observations indicated widespread use of strategies covered during the intervention.

Table 29

Observation 2

Response	*n*	Percent
Read Directions	34	100
Read Rubric	34	100
Note Cards	34	100
Research	34	100
Make Working Outline	34	100
Proofread/Edit	31	91
Use Transition Sheet	26	76

The informal observation that occurred during the posttest indicated widespread use of strategies participants indicated they planned to use and of the strategies taught during the intervention. Five of the strategies taught were observed being used by all of the participants.

Microanalysis 5

> *I feel very confident because I followed the skills and tools I learned during this experiment.*

Microanalysis 5 consisted of six questions and was administered after the posttest. The goal of this assessment was to gather information on participants' beliefs, attributions, goals, and strategy choice at the conclusion of study. Question 1 (see Table 30), "How do you feel as you hand in this paper to be graded?" was asked to ascertain

feelings related to writing apprehension. Four themes emerged during analysis: one positive theme into which feeling good or great, feeling confident, feeling more positive about the paper as compared to the pretest were collapsed. Thirty-one participants (88%) felt good, great, or confident, 1 (3%) felt nervous, 1(3%) felt happy to be done, and 1 (3%), felt the paper could use more work.

Table 30

Question 1—How Do You Feel as You Hand in This Paper to Be Graded?

Response	*n*	Percent
Good or great/Confident/Did better than on pretest	31	88
Nervous	1	3
Happy to be done	1	3
Could use more work	1	3

Question 2 consisted of two parts. Part 1, "How confident do you feel this essay will earn a grade of C or better?" was asked to help indicate participants' writing self-efficacy (see Table 31). Two themes emerged overall, confident 32 (94%) and not confident 2 (6%).

Table 31

Question 2, P1—How Confident Do You Feel This Essay Will Earn a Grade of C or Better?

Response	*n*	Percent
Confident	32	94
Not confident	2	6

Part 2, “Why do you feel that way?” was asked to help identify the source of participants’ attributions (see Table 32). Eight themes emerged, with one theme being dominant. Twenty-seven participants (79%) attributed their feelings to using skills learned during the intervention. Other participants attributed feelings to working 2 (6%), being more organized 2 (6%), writing well 2 (6%), not having enough time 1 (3%), and not being able to write well in English 1 (3%). One participant declined to give a reason.

Table 32

Question 2, P2—Why Do You Feel That Way?

Response	*n*	Percent
Used skills learned during experiment	27	79
Worked hard	2	6
More organized	2	6
I write well	2	6
Not enough time	1	3
My English is not good	1	3
No reason given	1	3

Question 3 also consisted of two parts. Part 1, “How confident do you feel that you wrote a clear and arguable thesis statement?” was asked to help ascertain how much the intervention helped students learn skills essential to writing a quality research paper (see Table 33). Confident 32 (94%), somewhat confident 1 (3%), and not confident 1 (3%) were the three themes that emerged during the data analysis.

Part 2 of question 3, “Why do you feel that way?” was asked to help clarify to what participants attributed feelings regarding confidence (see Table 34). Seven themes

to which students attributed their feelings were apparent in the data: stating a position and/or argument clearly 19 (56%), contains three parts 3 (9%), a sense of working hard or spending time on the task 3 (9%), feeling the topic was simple 1 (3%), covering or supporting the whole paper 3 (9%), and not a strength 1 (3%). Three participants declined to give a response to part 2 of question 3.

Table 33

Question 3, P1—How Confident Do You Feel That You Wrote a Clear and Arguable Thesis Statement?

Response	*n*	Percent
Confident	32	94
Somewhat confident	1	3
Not confident	1	3

Table 34

Question 3, P2—Why Do You Feel That Way?

Response	*n*	Percent
States position/Argument Clearly	19	56
Contains 3 Parts	9	26
No response	3	9
Spent time on it/Worked Hard	3	9
Issue was simple	1	3
Not a strength	2	6
Covered/Supports whole paper	2	6

Another two-part question was asked to discover if participants felt confident in their abilities to back up their thesis statements. Question 4, "How confident do you feel that you provided critical and relevant support for your thesis?" evoked responses of confident 32 (94%), somewhat confident 1 (3%), and not confident 1 (3%) (see Table 35).

Table 35

Question 4—How Confident Do You Feel That You Provided Critical and Relevant Support for Your Thesis?

Response	*n*	Percent
Confident	32	94
Somewhat confident	1	3
Not confident	1	3

Part 2, "Why do you feel that way?" was asked to help identify participants'' attributions for feelings of confidence (see Table 36). Seven overarching themes emerged, and one participant did not provide an answer to this question. Twenty-four participants (71%) indicated that they used quality and relevant information to support their thesis statements, seven (21%) stated they followed and/or supported their thesis statements, and one felt he or she tried hard. Another individual stated he or she wrote about several topics, while one stated he or she did not feel over-confident. One participant indicated that he or she did not feel confident.

In order to distinguish if and how participants approached the posttest differently from the pretest (strategy use), question 5 asked “What, if anything, did you do differently from the pretest?” (see Table 37).

Table 36

Question 4, P2—Why Do You Feel That Way?

Response	*n*	Percent
Followed/Supported Thesis	7	21
Used quality/Relevant support	24	71
No response	3	9
I tried	1	3
Did not do well	1	3
Wrote about many topics	1	3
Not over confident	1	3

Table 37

Question 5, P1—What, if Anything, Did You Do Differently from the Pretest?

Response	*n*	Percent
Researched more/longer	6	18
Used better writing techniques	5	15
More effort/More focused/Took more seriously	4	12
Nothing different	2	6
More organized	3	9
Everything/Almost Everything	2	6
Made outline	3	9
Cited sources/Included Parenthetical	2	6
Used a better strategy/What I learned	12	35
Tried to paraphrase	1	3
More time (not really)	1	3
Proofread/Edit	1	3

Twelve behaviors were identified from the data. The most common response identified using what was learned and/or a strategy learned 12 (35%). Six participants (18%) indicated that they spent more time on research, five (15%) suggested they used better writing techniques, four (12%) claimed they took the task more seriously or focused more, three (9%) said they made an outline, three (9%) felt they were more organized, and two (6%) claimed they did almost everything differently. Two participants (6%) said they were sure to include citations and one said he or she tried to paraphrase. It was interesting that one participant felt short of time since the exact amount of time was given for the pre and posttests. Finally, two participants (6%) claimed to have done nothing differently. Four participants (12%) failed to provide information on motivations for behaviors mentioned. One participant claimed he or she did things the same because he or she was a good writer.

Question 5 further asked participants to elaborate on what they did differently, and if they did things the same, why they chose to do so (see Table 38). Nineteen participants (59%) indicated they altered their approach to the posttest due to a desire to do better than they had on the pretest. Seven participants (21%) indicated the reason for a deviation in approach was due to feeling what they had learned was helpful, while two (6%) stated the new process worked well for them. One participant indicated they changed approach to include an outline, one deviated so as not to cheat, and three (9%) failed to provide a response. Only one participant indicated he or she did not approach the posttest differently from the pretest, stating the reason, “I write well” (see Table 39).

The final question was asked to help ascertain apprehension. In the first part of question 6, “How do you feel about having this paper graded?” responses were easily assigned to four categories: positive 25 (74%), negative 5 (15%), neutral 3 (9%), and curious 1 (3%) (see Table 40).

Table 38

Question 5, P2—Elaborate on Why Did Things Differently

Response	*n*	Percent
Feel what I learned is useful/helpful	7	21
Works well for me	2	6
No response	3	9
To Do better	19	59
So not cheat	1	3
To follow outline	1	3

Table 39

Question 5, P3—Elaborate on Why Did Things Differently

Response	*n*	Percent
I write well	1	3

Table 40

Question 6, P1—How Do You Feel about Having This Paper Graded?

Response	*n*	Percent
Positive	25	74
Negative	5	15
Neutral	3	9
Curious	1	3

The second part of question 6 (see Table 41), "Why do you feel this way?" was asked to help ascertain participants' attributions for feelings about having their papers evaluated. Although four participants failed to provide any response to this question, other participants provided eight reasons for feelings. Fourteen participants (41%) indicated they felt positive about their papers being graded due to feelings of having acquired new and/or more advanced writing skills. Seven participants (21%) indicated confidence in their writing abilities, four (12%) indicated they were not worried, two (6%) were curious to see if their score had improved from the pretest, one expressed a desire to learn from mistakes, one that he or she cannot write well in English, and one stated that he or she does not care about grades.

Table 41

Question 6, P1—Why Do You Feel This Way?

Response	*n*	Percent
Have confidence in writing ability	7	21
Have more knowledge/writing skills	14	41
Want to learn from mistakes	1	3
Don't care about my grades	1	3
Can't write well in English	1	3
Not worried	4	12
Want to see if I improved	2	6
No response	4	12
Feel like I'm being judged	1	3

The fifth and final microanalytic evaluation revealed that participants felt more optimistic after completing the posttest and that they believed they would earn a passing

score. For the most part, attributions for such feelings involved feeling more confident in their writing abilities and having acquired new skills, which they had used. The majority of participants felt positive about their abilities to write a quality thesis statement and provide support due to skills taught during the intervention. Overall, participants indicated a desire to perform better on the posttest than they had on the pretest, to utilize strategies and skills they had been taught in order to accomplish that goal, and communicated feelings of increased competency in their writing skills.

CHAPTER V

DISCUSSION

Introduction

While chapter IV presented the results of the study, Chapter V consists of: a summary of the study, a discussion of the findings, implications for practice, recommendations for further research, and conclusions. The goal of this chapter is to expand on the constructs that were investigated in an attempt to provide a deeper understanding of their influence on writing research papers and implications for writing interventions. Finally, a synthesis is provided to present the potential implications of what was achieved in this research study.

Summary of the Study

This chapter opens with a summary of the problem, the purpose, and the structure of the study, and is followed by the findings as they relate to social cognitive theory. Quantitative and qualitative findings are presented separately, as they relate to each of the four research questions. Conclusions drawn from the findings of the study are then discussed. The chapter concludes with a discussion of the implications for practice and recommendations for future research.

Writing is a complex process most American school children fail to master. This is indicated by results of the National Assessment of Educational Progress (NAEP) writing assessment, 2011, which showed just one-quarter of eighth and 12th-grade

students who took the assessment met or exceeded proficiency. In other words, 80% of students who took the NAEP assessment showed only "partial mastery of prerequisite knowledge and skills that are fundamental for proficient work at each grade assessed" (The Nation's Report Card: Writing 2011). Children, adolescents, and many adults lack the basic writing skills necessary for success in school and the workplace (Graham & Perin, 2007b). Continued efforts must be made to advance instructional techniques designed to improve student writing performance.

The purpose of this study was to test the impact of a writing intervention based on the self-regulated strategy development (SRSD) work of Harris and Graham (1999). Specifically, the study was designed to improve high school students' self-efficacy for writing research papers on a science topic, reduce anxiety related to such writing, increase the use of self-regulatory strategies, and as such improve the quality of research papers. The intervention provided the tools necessary for planning, organizing, and executing the complex writing assignments students often encounter in high school and the post-secondary setting.

The study applied an embedded mixed methodology, and it was hypothesized that through the utilization of strategies taught during a SRSD-based writing intervention, students would show an increase in writing self-efficacy, a decrease in writing apprehension, an increase in strategy use, and would write higher quality research papers. In summary, since it was found that "individual differences in motivation predict writing," (Graham, 2006, p. 467), it was hypothesized that by focusing on certain

affective aspects involved with writing, versus simply the process or product, student writing performance would improve.

The study included 34 students at a parochial high school in a mid-Atlantic state and took place during two, upper level science classes. All participants completed a pretest and a posttest in order to measure the effectiveness of the intervention on writing quality. In addition, participants completed surveys at three separate time points during the study to measure writing self-efficacy and writing apprehension. Five microanalytic assessments were administered to help gain further insight into participants' thoughts and actions related to the writing process. Finally, participants were informally observed twice during the study to ascertain to what extent strategies were used.

The study sought to answer the following four research questions:

1. How efficacious are high school students in upper grade science classes about writing research papers before, during, and after a writing intervention?
2. How apprehensive are high school students in upper grade science classes when writing research papers before, during, and after a writing intervention?
3. How do they perform when writing research papers before, during, and after a writing intervention?
4. Can a writing intervention with a motivational component increase student writing self-efficacy, reduce student writing apprehension, increase the use of strategies when writing research papers, and improve the quality of research papers?

As a mixed methods approach was used, both quantitative and qualitative data were collected and analyzed to answer the research questions. Questions one and two were answered using quantitative data from the surveys and qualitative data from the microanalytic assessments. Question three was answered using quantitative data in the form of pretest and posttest scores, and question four was answered using quantitative data from surveys, qualitative data from the microanalytic assessments, and information from informal observations made during the pretest and the posttest (see Table 42).

Table 42

Research Questions

Research Question	Quantitative	Qualitative
RQ1	X	X
RQ2	X	X
RQ3	X	
RQ4	X	X

Discussion of the Findings

Prior research has failed to show that anxiety is directly linked to performance (Siegal, Galassi, & Ware, 1985; Pajares & Johnson, 1994, 1996; Pajares & Valiente, 2001). However, previous researchers (Pajares & Johnson, 1994, 1996; Pajares, Hartley & Valiante, 2001) have found that when academic anxiety correlates with academic outcomes, the relationship is typically marginalized if the influence of self-efficacy is removed. Addressing the role anxiety plays in academic tasks is primarily to address domains in which students may need self-efficacy boosted through cognitive skill

development (Bandura, 1997). In other words, once apprehension is revealed, the remedy may lie in addressing skill-deficits that often accompany such feelings, which in turn help promote positive feelings of self-efficacy. Below the implications of the findings are discussed for each research question.

Research Question 1

How efficacious are high school students in upper grade science classes about writing research papers?

Quantitative findings. Quantitative findings resulting from research question one indicated participants' writing self-efficacy was significantly impacted by feedback and the writing intervention. Following feedback on the pretest, participants' writing self-efficacy for writing a research paper on a science related topic dropped significantly. Such findings support Bandura's postulation that action or performance attainments, also referred to as mastery experiences are a most powerful source of self-efficacy (Bandura, 1986, 1997). Following the writing intervention, writing self-efficacy increased significantly. Results support Bandura's assertion that through the development of cognitive skills and successful practice, self-efficacy for tasks may be enhanced (Bandura, 1997).

Qualitative findings. Qualitative findings indicated that prior to the pretest, the majority (59%) of participants felt efficacious in their abilities to write a research paper on a science related topic. Conversely, only 9% of participants indicated they did not feel confident, while 15% indicated that they lacked the writing skills to write a research paper on a science related topic. Such high levels of writing self-efficacy were surprising

given the scores achieved on the pretest. Inaccurate perceptions of self-efficacy may have been a result of poor understanding of the task or from the inability to accurately assess writing ability (Bandura & Schunk, 1981). Referred to as calibration, or the correspondence of self-efficacy beliefs with actual performance, Bandura (1997) proposed that a positive sense of self-efficacy for a task is instrumental for successfully completing challenging tasks, however, when such estimates clearly exceed actual capability, it can be detrimental (Pajares, 1996). Typically, higher achieving students better estimate their capabilities, however, all but one of the participants in the study indicated average to above average grades in classes where writing is demanded, suggesting poor calibration was not related to achievement level.

The first microanalysis assessment was analyzed to examine not only self-efficacy, but attributions, strategy use, and goal setting. The reason for this was to help provide possible insight into reasons for feelings of competence for the task assigned. Since the intervention contained strategy and goal setting components designed to help increase writing self-efficacy, understanding these constructs added valuable information to the findings. While self-efficacy was high for the majority of the participants prior to the pretest, attributions for such efficacy were both internal and external. Internal attributions included positive feelings regarding skill level and feelings about writing in general and external attributions were related to the topic (e.g. positive self-efficacy was dependent on topic).

The microanalysis assessment also permitted an examination of strategy choice and use. Prior to the pretest, 12% of participants defined a process they intended to use,

while 41% stated they had no plans/strategies in mind. Fifty percent articulated a plan of some type, but these plans or strategies were varied and related to one part of the writing process, for example, making an outline or conducting research. Researchers have found that the use of deliberate strategies in writing has been effective in improving the quality of student writing and writing self-efficacy (Graham & Perin, 2007a; Mason, 2013).

Although 88% of participants stated they had a goal in mind prior to beginning the pretest, about half of the goals listed had to do with final outcomes such as getting a good grade or just getting it over and done with. Overall, the goals were simple and many did not relate to strategies mentioned: for example, while 41% of participants stated they had no plan in mind, they did have a goal. Other goals pertained to the quality of the writing and aspects related to that. Given that the literature supports the proposition that students, who set goals in academic tasks, may find it easier to progress through assignments, particularly those which comprise multiple, complex parts (Pintrich & de Groot, 1990; Schunk, 1994; Schunk & Zimmerman, 1997), these findings add some explanatory value to the pretest scores.

Research Question 2

How apprehensive are high school students in upper grade science classes when writing research papers?

Quantitative findings. Quantitative findings resulting from research question two indicated participants' writing apprehension was not significantly impacted by feedback following the pretest. However, writing apprehension was significantly impacted by the writing intervention. Overall, there was a significant decrease in writing

apprehension observed following the intervention. The research has consistently shown the importance of anxiety on the domain of academic writing and it has been suggested academic anxiety correlates with academic outcomes, with the relationship being marginalized when the influence of self-efficacy is removed (Pajares & Johnson, 1994). Findings of the current study support Bandura's (1997) assertion that providing students with skills in specific domains is a superior approach to palliative procedures in both reducing anxiety and increasing self-efficacy, self-efficacy that is founded in accurate perceptions of reality regarding skills, or more precise calibration.

Qualitative findings. Qualitative findings indicated that prior to the pretest, 76% of participants' indicated that feelings after receiving a grade on a research paper were completely dependent on the grade received. That is to say, their feelings correlate with grades, with good grades leading to positive feelings and low grades leading to negative grades. Another 9% indicated their feelings depended on how hard they felt they had worked. Only one participant indicated feeling negative after receiving a grade for a research paper. Overall, the qualitative data did not indicate participants' felt overly anxious prior to the pretest, and that all attributions for feelings were grade-dependent. Given the high self-efficacy scores, this was a logical finding.

Following the intervention and the posttest, a microanalytic assessment revealed that 74% of participants felt positive about having their posttests evaluated and 41% attributed such feelings to having more knowledge and/or writing skills. A further 21% indicated feeling confident in their writing ability, although no attributions could be

inferred. It should also be noted that 15% felt negative about having their work evaluated.

Research Question 3

How do high school students perform when writing research papers?

Quantitative findings. Quantitative findings resulting from research question three indicated a significant difference in the mean scores between pre and posttest. These results suggested that participants, who had received the writing intervention, wrote higher quality research papers than they did prior to the intervention. Going back to the research, this makes sense since it has been found that prior to starting the writing process, good writers plan, set goals, and use knowledge specific to the writing task in hand to produce quality papers. The intervention employed strategy instruction such as analyzing the task, planning, and editing. Writing strategies enhance self-regulation by providing students with a systematic approach that results in higher quality writing (Graham & Perin, 2007a). Furthermore, participants were taught self-regulatory strategies proficient writers use such as setting goals, monitoring progress, self-evaluation, and overcoming adversity through the use of positive self-statements. Since quality writing involves a combination of requisite skills, combined with self-regulatory processes (Schunk & Zimmerman, 2007a), the intervention targeted the skills necessary for writing research papers on a science topic, as well as other, affective constructs associated with positive writing outcomes.

Research Question 4

Can a writing intervention with a motivational component increase student writing self-efficacy, reduce student writing apprehension, increase the use of strategies when writing research papers, and improve the quality of research papers?

Quantitative findings. Findings from the quantitative data indicated that following the intervention, participants' writing self-efficacy was significantly higher, writing anxiety was significantly lower, and mean scores on the posttests were significantly higher. Such findings suggested the intervention was effective and produced positive results in the domains being investigated.

Qualitative findings. Findings from the qualitative data yielded mixed results and addressed the broader, yet connected constructs of strategy use and goal setting. Since the intervention was based in the SRSD work of Harris et al. (2008) it was deemed appropriate to examine the constructs. Qualitative data was collected using five microanalysis assessments and two informal observations. Each event will be discussed individually, broken down by construct.

Microanalysis 1

Self-efficacy. Prior to the pretest, the majority of participants indicated positive feelings of writing self-efficacy, and overall, indicated feelings of confidence. Approximately half of the participants who indicated confidence, attributed such confidence to a belief they possessed the writing skills necessary to write a research paper on a science related topic. Several participants' stated confidence was dependent upon variables such as feelings and/or knowledge about the topic. Three participants indicated

a lack of confidence due to a dislike of writing. Overall, the information collected in microanalysis 1 supported the findings of the quantitative data analysis: participants felt efficacious about their abilities to write a research paper on a science related topic.

Apprehension. Participants were asked to comment on how they feel after receiving a grade for a research paper. In general, participants' feelings were directly attributed to the grade received, and little indication of apprehension was alluded to. One participant stated, "I'm just glad it's over and done with" and three others expressed similar sentiments. It was not possible to deduce if such comments were indicative of apprehension or lack of interest in the topic. Three participants connected feelings to effort exerted. One participant indicated feeling surprised if he or she did well, perhaps alluding to apprehension, however, overall, apprehension was not deduced from responses in microanalysis 1. This supports the quantitative findings that participants did not feel apprehensive about writing a research paper and indicated a primary focal point for participants is the grade received.

Strategy use. Information collected indicated that while several participants had no plans prior to beginning the pretest, others did mention the intention to use various strategies. While only four participants stated they had a process to follow, others mentioned individual strategies they planned to use, such as, making an outline and conducting research. Seven participants indicated plans to "wing it," while not a strategy that is typically successful, was nonetheless identified as a method. Since research has supported the hypothesis that strategy use is effective in writing (Graham & Perin, 2007a;

Mason, 2013), it was surprising participants felt efficacious, yet failed to provide evidence of concrete strategy use.

Goals. Most participants stated they had a goal prior to writing a research paper, with several indicating goals connected to attaining a good grade. Only three participants stated they had no goal. While most goals mentioned involved grades, other goals included meeting the assignment requirements, proving a thesis or argument, learning or teaching about something, producing a quality paper, and just getting it over and done with. Most of the goals mentioned were not what Locke and Latham (2006) would consider optimal, in that they were neither particularly specific nor concrete with reference to the task assigned. Research has indicated that goals which are specific and concrete are most motivating and lead to better results. An exception to this was the goal to prove a thesis or an argument. Students, who have goals in mind prior to embarking on an academic task, have been shown to outperform students who do not set goals. Asked about what goals were for grades, most participants stated they felt they would get an A or B, with the remaining participants stating they felt they would get a C. Participants' predications in achieving high grades, while not surprising given the high writing self-efficacy and low writing apprehension felt, were nonetheless surprising based on findings of prior studies.

Observation 1

During the first informal observation, during the pretest, some support for participants' intentions as stated in microanalysis 1 was noted, as were some discrepancies. While all but one of the participants was observed conducting research,

only one was observed making an outline, despite fifteen stating they planned to do so. Several participants were observed paraphrasing information directly from websites to their papers by splitting their computer screens. Few participants were observed reading the directions or the rubric. Despite indicating intentions to plan and set goals, or evidence of Zimmerman's (2002b) forethought phase, intentions from this phase, did not, for the most part, result in action during the performance phase.

Microanalysis 2

Goals. In asking students how the grades they received compared to the grades they predicted or set as a goal, the majority stated the grade received was lower than expected. Given that the literature shows strategy use and specific goal setting results in higher quality writing, this finding was not surprising. What was surprising was the disconnect between participants' predictions and feelings and actual outcomes. Calibration is a possible explanation for this, but other explanations include lack of rigor or grade inflation in courses from which performance standards were inferred.

After receiving feedback on the pretest, participants were asked what they would do differently, if they could do it again. Results supported Zimmerman's (2002b) model of self-regulation, specifically, the cyclical feedback loop, in that it was clear that participants would change their behaviors in approaching the task based on feedback from prior performance. Most of the responses indicated participants would take corrective measures based on feedback to improve outcomes. It should be noted that some participants failed to provide a response to this question. In order to infer

information on participants' beliefs regarding the discrepancy between predicted and actual outcomes, a question on attributions was asked.

Interestingly, despite the findings from assessments given prior to the pretest, most participants attributed their lower than expected performance to internal factors, that is factors over which they exercise control. Examples included making careless errors, lack of writing skills, not planning, failure to proofread, and being off topic. Participants who attributed lower than expected scores to external factors most often mentioned that the grading was harder than expected. Some stated they are more successful writers when writing in contexts other than the school setting. The fact participants mostly attributed outcomes to an internal locus of control was promising for the potential impact of the intervention.

Microanalysis 3

The purpose of microanalysis 3, which was administered during the independent practice phase of the intervention, was to ascertain to what extent participants were, or were not using the strategies and procedures taught during the intervention. It was hoped participants would use what they had learned, not just to improve their writing skills, but to add some substance to their writing self-efficacy. As Bandura (1997) proposed, skill enhancement not only leads to better performance outcomes, but also increases self-efficacy and reduces anxiety. It was also hoped that through a combination of utilizing strategies and simultaneously giving voice and explanations to them, participants would become more self-regulated in their writing.

The first question asked participants to stop what they were doing, followed by a question asking them why they were doing what they were. All participants were engaged in tasks addressed during the intervention, although one simply said he or she was, "typing." It was noteworthy that ten of the participants, were, at the time of the question, engaged in a task that is unique to the intervention: using a working outline and converting it directly to a paper. Reasons given for actions were all relevant and related to what was learned during the intervention. Examples included helping with organization and improving or working on paragraphs. Next, participants were asked a question to help ascertain if and to what extent what they were doing deviated from the norm.

It was important to gain insight into how much the intervention contributed to student writing behaviors. Participants, who were engaged in the more unique activities taught during the intervention, indicated this was a new approach, while others, engaged in more generic activities, such as editing or proofreading stated this was something they typically did. About half of the participants indicated that in the past they just wrote the paper without any strategy use, gathering notes and writing the paper, just sitting down and writing the paper, and writing paragraphs straight from sources. Finally, participants were asked what they planned to do next. It was hoped responses would provide information on self-regulation and goal setting. In other words, were participants following a plan as they had been instructed? All responses indicated a plan was being followed and showed tasks were being performed in the order taught during the

intervention. Responses were promising in that they were indicative of participants using skills and strategies taught during the intervention.

Microanalysis 4

The purpose of microanalysis 4, which was administered just prior to the posttest, was to ascertain to what extent participants felt confident about their abilities to write a research paper on a science related topic and to what they attributed such feelings. Furthermore, it was hoped information regarding intentions to plan, set goals, and use strategies would be captured and to what extent the intervention had an impact on such actions. It was hypothesized that due to the intervention, participants writing self-efficacy would be more in sync with outcomes, participants would demonstrate the forethought phase of self-regulatory behavior as described by Zimmerman (2002a), and would show improvement in writing outcomes. Since the purpose was to address the same feelings, plans, goals, and attributions as the first microanalysis, the questions were very similar.

Twenty-seven participants indicated that they felt confident in their abilities to write a research paper on a science related topic; this indicated that seven more participants had such feelings following the intervention, than prior to the intervention. Of the remaining participants, six indicated they felt better and one indicated his or her belief that he or she cannot write. Findings complement the quantitative findings on writing self-efficacy.

In order to examine participants' attributions to feeling in their abilities, they were asked why they felt the way they felt. It was important to measure to what extent the

intervention may or may not have impacted participants' writing self-efficacy. Overall, participants indicated they knew what to do, knew more, and/or used what they learned. Interestingly, three participants indicated the intervention provided the only instruction they had even received on writing research papers. Participants' attributions at this point differed from those provided at the onset of the study in that they were largely indicative of feelings of competence grounded in knowledge, as opposed to attributions attached to the assignment, such as "it depends on the topic" or just general feelings of confidence. Such findings support the impact of mastery experiences on self-efficacy (Bandura, 1997) and the cyclical nature of self-regulatory processes (Zimmerman, 2002a, 2002b). Participants having practiced the research writing process from start to finish indicated the use of knowledge gained during the intervention during the forethought phase of the posttest. This suggests that for several of the participants, the cyclical feedback loop was in play at this time.

As opposed to microanalysis one, which revealed some participants' intentions to "wing it," microanalysis two showed no such intentions with regards to strategy use. Twenty participants stated their intentions to use the steps they were taught during the intervention. Almost all of the factors mentioned by participants included aspects taught during the intervention, such as: making an outline, editing, proofreading, and making note cards. All participants mentioned strategy use of some type, a few included personal attributions, such as not being lazy, working harder, and not stressing. Given such findings, compared to those during microanalysis one, it was hoped the quality of the posttest papers would be superior to those written during the pretest, as effort made

during the performance phase should result superior outcomes. Furthermore, increased use of strategies has been linked to superior writing performance (Graham & Perin, 2007a; Mason, 2013) and proficient writers use self-regulatory strategies (Hidi & Boscolo, 2006).

While all participants' stated they had a goal when writing the research paper for the posttest, most goals were related to grades, as they had been prior to the pretest; twenty articulated a desire to do better than they had on the pretest. Five indicated wanting to do the best they could. Such goals did not reflect what was taught during the intervention, as they were not concrete, but did meet the criteria taught of setting goals of moderate difficulty—aiming to do better. Locke and Latham (2002) found that goals which are concrete and specific are most effective, as are those of moderate difficulty. Analysis of findings from microanalysis 4 indicated that participants felt self-efficacious about their ability to write a research paper on a science related topics and that they planned to use skills acquired during the intervention. Such findings were similar to the survey results.

Observation 2

During the second, informal observation, which occurred during the posttest, all participants were observed reading the directions and rubric. This was a dramatic improvement over the pretest, when only five participants were observed reading the directions and three reading the rubric. This was encouraging, as during the intervention, participants were explicitly taught strategies for reading both the directions and the rubric. Participants were also taught to use note cards as a strategy for organizing

research. During the posttest observation, all participants were observed using notecards. Since all participants turned in their note cards with their papers, it was evident all had conducted research and none had relied on splitting the screen and paraphrasing straight from the internet. All participants made outlines, used the editing checklist, and MLA checklist, all of which were handed in. All participants were also observed using easybib as suggested during the intervention. Only 26 participants made use of the transition list they had been given. Overall, the behaviors observed indicated use of skills and strategies taught during the intervention, use of intended strategies, and use of strategies not articulated prior to the posttest, but used nonetheless. Observation 2 indicated that participants were engaged in self-regulated strategy use.

Microanalysis 5

At the conclusion of the posttest, microanalysis 5 was administered. This detailed assessment aimed to probe participants on their feelings and attributions following all phases of the study. In addition, it asked questions specific to a skill and strategy taught during the intervention. Finally, participants were asked what they did differently from the pretest. Almost all of the participants indicated feeling confident they attained a grade of C or higher, and most attributed this to having used new skills they had learned during the study. When asked about confidence to write a clear and arguable thesis statement, all but one participant expressed feeling confident and most of the participants attributed such feelings to skills and/or strategies covered during the intervention. In addition, all but one participant indicated feeling confident in their abilities to provide

relevant support for their thesis statements. Reasons given for such feelings were logical and indicated use of skills covered during the intervention.

All but two participants indicated using different skills and/or strategies from the pretest, and reasons given included beliefs that what they learned was useful and a desire to do better. The majority of participants indicated feeling positive about having their papers graded, and cited reasons for such feelings as having confidence in writing ability and feeling more knowledgeable about writing. Taken as a whole, results of microanalysis 5, combined with higher scores on the posttest, suggested that the writing intervention was effective in teaching participants new skills and self-regulatory strategies to help write quality research papers on a science related topic. These findings are consistent with previous findings on the impact of self-regulated strategy development on writing instruction (Harris et al., 2008).

Summary of Patterns that Emerged

During the analysis of the microanalytic data, patterns emerged that provided additional insight into participants' reactions to the study and into some of the dynamic processes which were being investigated. For the most part, all participants indicated feeling confident or efficacious in their capabilities to write a research paper on a science topic prior to the intervention. However, the reasons given for such confidence as articulated by participants were very general, such as "I have skills" and "it depends on the topic." There was little indication that confidence in capability was grounded in knowledge or specific skills.

Following feedback on the pretest, most participants indicated that they performed at a lower level than anticipated. It can be inferred that such feedback eroded confidence in capability, as reasons cited for low performance were for the most part based on personal attributions such as lack of writing knowledge, lack of effort, and a failure to use strategies. One participant stated, "I have never been taught to write a research paper before." Following the intervention, it was evident that participants who had felt confident prior to the study, but less confident following feedback on the pretest, felt more confident in their capabilities following the intervention. Participants' articulated reasons for increased confidence in capability were grounded in skills acquisition and a sense of knowing what to do, with one female participant stating, "I now know what to do." This lends credence to Bandura's (1997) assertion that self-efficacy is impacted in large part by mastery experiences or knowledge and positive experiences with tasks. Such findings also support the feedback loop proposed by Zimmerman (2000, 2002b), as all participants altered their behavior on a task following feedback, practice, and instruction. Following the intervention, only one participant indicated a lack of confidence to perform at a higher level than he or she had prior to the intervention. This participant was the only participant in the study for whom English is a second language. In fact, it was only his second year in the U.S. and he had spent all of the long school holidays back in his home country. Unfamiliarity with English—speaking, comprehension, and writing conventions—was definitely a barrier for this participant. This was both observed and stated directly by the participant.

In terms of setting goals, every participant who indicated they had no plan or goal in mind prior to completing the pretest did specify a strategy they planned to use on the posttest. No one suggested they planned to "wing it," and more than one stated in these words or other variations, "I plan to use the process I just learned." Such information indicated the possibility that a feedback loop had been initiated as participants specified plans to use strategies following the intervention. It was encouraging that all of the strategies and plans listed had been covered during the intervention, including, but not limited to: reading directions, following the rubric, making an outline, organizing and conducting research prior to writing, and following steps.

The microanalysis administered during group practice was highly indicative of findings from the self-regulation research. Every participant acknowledged that they had changed their behaviors while writing a research paper. Reasons articulated for such changes were directly related to what they had been taught during the intervention. One participant stated that he or she was editing in order to "catch my careless mistakes," while another participant stated that he or she was making an outline, "so I can organize my thoughts and research before I start writing." When asked what they planned to do next, all participants provided a logical answer in terms of where they were in the writing process. One group indicated that they were writing their paper because "we have done everything so we are prepared."

Overall, the value of the qualitative data obtained through microanalysis was confirmed by the information obtained. It was found that generally participants' writing self-efficacy, although high prior to feedback on the pretest, was based on broad and

general ideas versus concrete knowledge or skills. By the end of the study, it could be inferred from participants' responses to microanalytic questions that writing self-efficacy was grounded in knowledge acquired and skills and strategies used. Additionally, whereas at the beginning of the study, goals and strategies when articulated were not used, as evident from the results of the first informal observation, by the end of the study, participants were able to articulate specific goals and strategies and were observed using them. Such findings were both rewarding from the perspective of an educator and researcher and optimistic in terms of the potential microanalysis offers for future research in multiple psychological constructs.

Implications for Practice

Despite increased attention to writing, there is still no universally accepted framework mapping out what students should be able to do (Applebee et al., 2013). The Common Core specifies three types of writing: narrative, informative/explanatory, and argument (Common Core State Standards Initiative, 2012), which, in theory should allow various disciplines to incorporate writing into their curricula. However, state-mandated testing in multiple disciplines, including science, puts pressure on educators that make it difficult for them to assign writing assignments with any substance, thus writing is given scant attention in most classrooms.

The findings of this study have far-reaching implications for many stakeholders interested in helping students gain the writing skills required for success in the classroom and beyond. This study identified successful strategies for teaching students to write research papers using self-regulatory strategies on a science-related topic and helped

them feel more efficacious and less anxious about their writing abilities, however, the intervention could be expanded to other content areas.

For Language Arts teachers in similar contexts, the study offers an expansive intervention that could be implemented at any level in high school. Given the breadth and scope of the intervention, teachers may wish to spread the lessons out, weaving in other content as appropriate. This may lessen the chances of students losing interest, as well as provide teachers with the time necessary to review multiple drafts. Tailoring the lessons to meet a specific student population and skill-set would likely maximize its effectiveness in other settings, dissimilar to the one in which the study occurred.

This study could also be useful to science teachers, who feel incapable of integrating sufficient writing instruction into their classrooms, at the expense of content. Since the intervention is highly comprehensive, teachers, other than English teachers, should be able to implement the lessons. The lessons also lend themselves well to collaboration across the curriculum. English teachers and science teachers interested in promoting excellence in writing could partner to implement the intervention. Doing so allows for maximizing the expertise of both the teacher of writing and the teacher of science. Finally, the incremental tasks involved in the lessons permit multiple opportunities for assessment and for students to share in-depth knowledge with peers on specific topics. Teachers could add a presentation requirement to facilitate such knowledge sharing.

English department heads will find this study and its findings useful. Given the lack of in-depth writing assignments that students are assigned, this intervention provides

a means by which to provide teachers with a manageable and effective intervention which can be spread out over a longer period of time. While English teachers may struggle to find ways to implement in-depth writing instruction, department heads will have a practical and effective resource to share with teachers. Finally, this study will also be useful for district coordinators and principals as they struggle to design a universal writing framework—one that maps out what students should be able to do and how they can get there—one that encourages complex cognitive processes.

Given the absence of writing methods classes in most science education programs, Curriculum Coordinators and school administrators could use the findings of this study to design and conduct teacher in-service training to improve the writing instruction provided by content area teachers. The comprehensive nature of this intervention makes it conducive to such a scenario.

At the university level, Teacher Education program designers might consider adding a writing component to science education programs. Doing so might make it easier for science teachers to implement more writing in their classrooms and make them less apprehensive about integrating a writing intervention like the one done in this study into their own science classrooms. Science pre-service teachers may themselves be anxious and unconfident about their own writing abilities, thus this is an avenue worthy of consideration. Results of such an addition may help further in the national effort to improve student writing.

Recommendations for Further Research

The goal of this study was investigate the effects of an SRSD-based writing intervention on the writing self-efficacy, writing apprehension, and writing performance of high school students in two science classes. During the intervention, data were collected to address the four research questions pertaining to this goal. The study was conducted, which included surveys, informal observations, microanalytic assessments, pre and posttests, and an intensive writing intervention; many significant findings were observed following an analysis of the data.

While many of the findings were significant, there are some limitations, which must be addressed. One limitation is that the sample was small and drawn from a narrow demographic. As participants all attended the same parochial high school, the sample was rather homogeneous. Other limitations were in the design of the study, as no control was used and due to time constraints, there was no measure used to test whether or not participants transferred the skills to other contexts. Due to lack of a control group, results cannot be generalized. Finally, much of the literature on the topic of writing and self-efficacy is older. That being said, the quality of these studies still holds, and in them are contained many valuable ideas and insights for future studies in diverse settings. While the age of the studies could be a limitation, it is believed that the quality of the studies, combined with the prestige the authors have in the field, make up for this shortcoming. Given the connections found between self-efficacy and writing performance, it was deemed appropriate to utilize the best studies available, regardless of age.

Given the conclusive characteristic of the research on study participants' writing self-efficacy, writing apprehension, and writing quality, it is imperative that studies be conducted with the goal of identifying effective interventions and strategies to enhance adolescent self-efficacy and the use of self-regulatory strategies in science writing in other settings. Alternate means of self-efficacy enhancement should also be investigated, for example, tutoring or academic coaching as ways to buffer the negative impacts of schooling on many adolescents. Furthermore, studies at the microanalytic level or that are domain specific should address how to promote self-efficacy in specific subjects. Such studies would allow researchers to track changes in writing self-efficacy and writing anxiety as writing skills improve over time. This would be a valuable research contribution. For example, given that writing is well-known to be a weakness for American students, further studies should be conducted that examine the role of strategies as an intervention to enhance self-efficacy, and therefore improve performance in writing.

From the information presented on self-regulation and writing, it is apparent that gaps in the literature exist. Future writing interventions should consider that it is not sufficient to assume that students will, by themselves, effectively make the transition from the observational level of self-regulation to the self-regulated level. It will be important for educators to realize, that just as students differ in levels of writing skills attained, so too do they differ with relation to where they are form a self-regulatory perspective (Schunk & Zimmerman, 2007a). Interventions which take this into account, for example, by having students work in groups according to where they are—from a

self-regulatory perspective with regards to writing—might be easier for teachers to implement.

It was noted that no studies targeted writing higher level research papers, notably in the content areas such as social studies and science, genres which are important in high school and the post-secondary setting. While there have been calls for disciplinary literacy in the wake of the Common Core curriculum adoption by most states (Shanahan & Shanahan, 2014) and Bazerman (2008) posits that the cognitive practices involved in writing differ by genre and discipline, there is still a place for sound, basic writing instruction that includes a self-regulatory component to lay the foundation students require to write. Without such a foundation, it is unrealistic to think students will become effective discipline-specific writers. Interventions that include sound strategies for planning, organizing, and revising research papers should be the standard in schools. Such interventions should embed the teaching of self-regulatory strategies to help students understand exactly how and when to apply such strategies, for example through the use of modeling. SRSD instruction offers a valuable contribution to students at all levels, since all students benefit from enhanced self-regulatory skills. Interventions should also be tailored to specific populations.

Given the lack of interventions addressing the genre of writing a research paper, an intervention should be developed that teaches high school students how to write quality research papers from start (the forethought phase) to finish (the self-reflection phase). Furthermore, such an intervention should progress, in sequence, through the levels of self-regulatory development to allow students to generalize the strategies they

learn across all disciplines in the curriculum and attend to affect, such as anxiety with writing. Such an intervention should target multiple skills, including: generating ideas, planning, strategy use, effective research, writing a thesis statement, proper format, how to cite sources, organization, structure, use of transitions, and revision. Furthermore, by teaching such skills using SRSD instruction, students will benefit from the likely positive impacts of such instruction on their writing quality, as well as their self-regulatory strategy use, writing self-efficacy, and writing affect.

Future research should aim to collect such information as Schunk and Swartz (1993b) did in their study of elementary school students. Such information would also provide researchers with information as to whether the knowledge participants demonstrated during the posttest was a simple reaction to recently taught material or evidence in a developmental change. Furthermore, future studies could take a team approach in order to include more participants. Given the quantity of the data that needs analysis, notably multiple research papers, researchers working in a team would be able to conduct the study on a larger scale. A team approach might also permit providing the intervention to the control group at the conclusion of the study so that all students benefit. In such a situation, testing the transferability and maintenance of the skills taught would be more attainable when considering the time constraints due to school schedules.

Additional future research on this topic should be expanded to more diverse populations in other geographical locations. Moreover, the intervention should be modified to address other content area subjects, such as history. It would be helpful to implement the intervention in the ninth grade, and follow up with a modified version

each year as students progress through high school. Having longitudinal data on how students' research writing in content areas progresses throughout high school following SRSD instruction would provide valuable information for researchers and teachers of writing.

Another avenue of research could be to observe as teachers implement the intervention within the regular classroom setting as part of the curriculum. Teachers, with the ability to utilize a longer time period, may get different results than a researcher imposing the intervention from outside. Furthermore, teachers working with their own students may have the time to provide more instructor feedback on various drafts. This would likely strengthen the intervention and lead to stronger long-term results for students.

While this was the first study of the kind to implement such an intervention to whole science classes, future studies that would add substance to the research literature include one whereby the intervention is conducted across departments/classes. Watts and Burnett (2012) found significant value in this approach with their sample of college students in an English and an agronomy class. English teachers might pair up with science teachers to provide the intervention in two settings, whereby one teacher is the expert on writing, and the other, the expert on the relevant science content. Through the act of collaborative planning and assessing, just as Watts and Burnett (2012) found, teachers might find those productive, dual problem-solving spaces. Such a study would further promote an excellent example of writing across the curriculum, while aligning well with Common Core standards.

Since self-regulatory processes are dynamic in nature, future studies should attempt to focus on how self-regulation processes change over time as learners gain experience. Furthermore, in order to get at fine-grained processes, technology should be utilized to examine this dynamic nature. For example, learners engaged in the writing process could be video-recorded and subsequently asked to provide commentary on what they were doing and why. Such an approach might help address any disconnect between the social cognitive model, which although dynamic in nature, is often used in studies which attempt to isolate effects at static points in time. Finally, any future studies could analyze results by gender to see if there are significant differences in results.

Conclusions

The findings of this study expanded on the work of previous researchers in the areas of writing, motivational attributes, apprehension, and SRSD. This was the first study which examined the effectiveness of an SRSD writing intervention on research writing in a whole-class, science setting and the first to incorporate a microanalysis component. This study revealed that following an SRSD-based writing intervention in two science classes, study participants had increased writing self-efficacy, reduced writing apprehension, used more self-regulatory strategies, and wrote higher quality research papers on a science-related topic. The microanalyses provided rich information on how participants felt about science writing and on self-regulatory processes. Future research should build on the significant findings of this study.

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APPENDIX A

IRB APPROVAL FORM

THE UNIVERSITY of NORTH CAROLINA
GREENSBORO

OFFICE OF RESEARCH INTEGRITY
2718 Beverly Cooper Moore and Irene Mitchell Moore
Humanities and Research Administration Bldg.
PO Box 26170
Greensboro, NC 27402-6170
336.256.0253
Web site: www.uncg.edu/orc
Federalwide Assurance (FWA) #216

To: Anne Griswold
Teacher Ed/Higher Ed

From: UNCG IRB

Authorized signature on behalf of IRB

Approval Date: 3/12/2015
Expiration Date of Approval: 3/11/2016

RE: Notice of IRB Approval by Expedited Review (under 45 CFR 46.110)
Submission Type: Initial
Expedited Category: 7.Surveys/interviews/focus groups,6.Voice/image research recordings
Study #: 15-0107
Study Title: The Effects of an SRSD-Based Writing Intervention on the Writing Self-Efficacy, Writing Apprehension, and Writing Performance of High School Students: A Mixed Methods Study

This submission has been approved by the IRB for the period indicated. It has been determined that the risk involved in this research is no more than minimal.

Study Description:

The purpose of this mixed methods study is to test the impact of an intervention program designed to increase high school students' writing self-efficacy, increase the use of self-regulatory strategies, reduce anxiety related to writing, and as such, improve the quality of research papers. The intervention will provide the tools necessary for planning, organizing, and executing the complex writing assignments such students are charged with in the upper years of high school and the post secondary setting.

Regulatory and other findings:

- This research, which involves children, meets criteria at 45 CFR 46.404 (research involving no greater than minimal risk). Permission of one parent or guardian is sufficient.

Investigator's Responsibilities

Federal regulations require that all research be reviewed at least annually. It is the Principal Investigator's responsibility to submit for renewal and obtain approval before the expiration date. You may not continue any research activity beyond the expiration date without IRB approval. Failure to receive approval for continuation before the expiration date will result in automatic termination of the approval for this study on the expiration date.

Signed letters, along with stamped copies of consent forms and other recruitment materials will be scanned to you in a separate email. **Stamped consent forms must be used unless the IRB has given you approval to waive this requirement.** Please notify the ORI office immediately if you have an issue with the stamped consents forms.

You are required to obtain IRB approval for any changes to any aspect of this study before they can be implemented (use the modification application available at http://integrity.uncg.edu/institutional-review-board/). Should any adverse event or unanticipated problem involving risks to subjects or others occur it must be reported immediately to the IRB using the "Unanticipated Problem-Adverse Event Form" at the same website. Please be aware that valid human subjects training and signed statements of confidentiality for all members of research team need to be kept on file with the lead investigator. Please note that you will also need to remain in compliance with the university "Access To and Retention of Research Data" Policy which can be found http://policy.uncg.edu/research_data/.

CC:

APPENDIX B

PARENTAL PERMISSION FORM

Kathy Griswold
C/O Bishop McGuinness Catholic High School
1725 HWY 66 S.
Kernersville, NC 27284

Date

Dear Parent(s) and/or Guardian(s),

Re: Writing intervention research study being conducted at Bishop McGuiness High School

Your Bishop McGuinness student is being invited to participate in a research project. Kathy Griswold, M.Ed is conducting the research study in order to complete her PhD in Teacher Education and Higher Education with a minor in Human Development and Family Sciences at the University of North Carolina at Greensboro. Ms. Griswold intends to investigate how students feel about their ability to plan, organize, and execute the complex writing assignments that will be assigned in high school and beyond. At the beginning, during, and at the end of the study, Ms. Griswold will assess students' beliefs, attitudes, knowledge, and procedures they follow during the writing process. In order to do this, short surveys will be administered. Furthermore, Ms. Griswold will conduct a writing intervention, the purpose of which is to increase student motivation for writing, decrease student anxiety about writing, increase strategy use during the writing process, and increase the quality of student writing. The writing intervention will target research papers specifically.

Ms. Griswold is working with in collaboration with Dr. DiBenedetto and Mr. Eklund. The writing intervention will take place during your student's Marine Science or Zoology class and will target writing skills students are expected to demonstrate in class assignments. Specifically, the intervention will consist of six detailed lessons designed to help students write quality research papers from start to finish. The lessons also include a motivational aspect, intended to enhance your student's positive feelings about his or her ability to plan, organize, and complete the complex, quality writing assignments required of them not only now, but also in college. Students will also participate in interviews. All students will receive the writing intervention as the intervention may positively impact his or her grade. Your students will be expected to complete the assignments during the intervention as the assignments are part of their grade for the science course. The purpose of this study is to request the use your student's surveys, pre/posttests, writing assignments and interviews as data for my dissertation.

Please note that while all students will receive the writing intervention, whether or not Ms. Griswold may use your student's data for her research study is voluntary. You have the right to refuse to allow your child's data to be used or to withdraw use of the data any time, without penalty. Your student will have the opportunity to earn the same amount of extra credit for his or her grade, regardless of whether permission is granted to use his or her data. The writing assignments required for the intervention are part of your student's Marine Science or Zoology class.

If you give permission for your child's data to be used as part of the study, please sign and return the consent form by _____If I do not hear from you by _____, I will follow up with a single phone call.

If you and your child agree for your child's data to be used and for them to participate in an interview, their name will be entered into a drawing for a $100 gift card.

If you agree for your child's surveys, pre/posttests, writing assignments, and interviews to be used as data, all information obtained in this study is strictly confidential unless disclosure is required by law (i.e. Ms. Griswold believes somebody is in danger). Every effort will be made to protect participants' personal information. No

information of who participates will be shared with other teachers or administrators. All information pertaining to the study will be kept in a locked file cabinet and some data may be stored on a password protected computer and/or an external hard drive, which will also be kept in a locked filing cabinet. Student names will not appear on any of the data collected: codes will be used. Each participant will be assigned an identification number (ID); only Ms. Griswold will have the information that connects students' names and ID numbers. If you choose not to allow your child's surveys, pre/posttests, writing assignments, to be used as data, this information will be shredded.

The entire study will be completed during class time and will enhance student knowledge of Marine Science or Zoology class in addition to the writing process.

Questions:

If you have questions, want more information or have suggestions, please contact Kathy Griswold M.Ed. who may be reached at akgriswo@uncg,edu (336) 416-4866 or Dale Schunk who may be reached at the University of North Carolina at Greensboro at dhschunk@uncg.edu.

If you have any concerns about your rights, how you are being treated, concerns or complaints about this project or benefits or risks associated with being in this study please contact the Office of Research Integrity at UNCG toll-free at (855)-251-2351.

Sincerely,

Anne Katherine (Kathy) Griswold

By signing this consent form, you are agreeing that you have read it or it has been read to you, you fully understand the contents of this document and consent to your child's data be used as part of this study. All of your questions concerning this study have been answered. By signing this form, you are agreeing that you are the legal parent or guardian of the child who wishes to participate in this study described to you by Kathy Griswold.

_____ Date: _____

Participant's Parent/Legal Guardian's Signature

UNCG IRB
Approved Consent Form
Valid from:
3/12/15 to **3/11/16**

APPENDIX C

ASSENT FOR HIGH SCHOOL PARTICIPANTS

UNIVERSITY OF NORTH CAROLINA AT GREENSBORO

Assent for High School Participants

Project Title: The impact of a self-regulatory writing intervention on adolescent research papers and attitudes towards writing: A Mixed Methods Study

Principal Investigator: Anne Katherine Griswold, M. Ed.

Why am I here?

We want to tell you about a research study we are doing. Research studies are done to find better ways of helping and understanding people or to get information about how things work. In this study we want to find out more. The purpose of this study is to test the impact of an intervention program designed to enhance high school students' positive beliefs about their abilities to write quality research papers, increase the use of strategies, reduce anxiety related to writing, and as such improve the quality of research papers. The intervention will provide some of the tools necessary for planning, organizing, and carrying out the complex writing assignments you will be expected to do in high school and college.

You are being asked to be in the study because you are in Dr. DiBenedetto of Mr. Eklund's science class. In a research study, only people who want to take part are allowed to do so.

WHAT WILL HAPPEN TO ME IN THIS RESEARCH STUDY?

If it is okay with you and you agree to join this study, you will be asked to

Before, during, and after the study is complete, you will be asked to fill out some surveys and questionnaires that ask you how confident you feel about writing research papers. The surveys will also ask questions about whether or not you feel anxious when you are assigned big research papers. After that, I will work with you on some strategies that may help you feel better about writing and I will ask you to write a paper using the strategies I teach you. I will ask you to complete the surveys again at the end of the study to help me see if the intervention worked. I will also ask you to participate in short interviews at times during the study, to which I will ask you to write your responses.

The writing intervention will take place during your 1st period Zoology or 6th period Marine Science class and will target writing skills you will be expected to demonstrate in class assignments. Specifically, the intervention will consist of six detailed lessons designed to help you write quality research papers from start to finish. The lessons also include a motivational aspect, intended to help you feel more positive about your ability to plan, organize, and complete the complex, quality writing assignments required not only now, but also in college.

These assignments are part of your regularly scheduled class. The purpose of this study is to request the use your surveys, pre/posttests, writing assignments and interviews as data for my dissertation.

HOW LONG WILL I BE IN THE RESEARCH STUDY?

You will be in this study for during the second semester of the 2014-2015 Bishop McGuinness school year.

CAN ANYTHING BAD HAPPEN TO ME?

Nothing bad can happen to you during the study beyond the normal feelings you experience when you write research papers.

CAN ANYTHING GOOD HAPPEN TO ME IN THIS RESEARCH STUDY?

We do not know if you will be helped by being in this project, but it is hope that you will learn some strategies that will help you write better quality research papers in high school and college. In addition, we may learn something that will help other students feel better about writing and become better writers in the future.

DO I HAVE OTHER CHOICES?

You will receive the instruction and complete the assignments as participation will contribute towards your grade. However, whether or not you allow Ms. Griswold to use the data she collects from you for her study is voluntary.

WHAT IF I DO NOT WANT TO BE IN THIS RESEARCH STUDY?

While you will receive the instruction and complete the assignments, you do not have to be part of this project. It is up to you. Whether or not you allow Ms. Griswold to use the data she collects from you, is up to you. If you do not allow your data to be used, it will all be shredded and disposed of. You can even say okay now, but change your mind later. All you have to do is tell us. No one will be mad at you if you change your mind.

WHAT ABOUT MY CONFIDENTIALITY?

We will do everything possible to make sure that your data and or records are kept confidential.

Unless required by law, like if it believed someone is in danger, only Ms. Griswold and her faculty advisor may review your study records. They are required to keep your personal information confidential.

WILL I BE PAID FOR BEING IN THIS RESEARCH STUDY?

At the conclusion of the study, you will eligible to receive 4 points of extra credit on your Quarter 3 grade for completing the pretest and surveys and 4 points of extra credit for Quarter 4 for completing the study. Also, if Ms, Griswold is allowed to use your data for the study, your name will be entered in a drawing to win a $100 gift card

DO MY PARENTS KNOW ABOUT THIS RESEARCH STUDY?

This study has been explained to your parent/parents/guardian and they have given permission for you to be in it.

WHAT IF I HAVE QUESTIONS?

You can ask Ms. Griswold anything about the study, or if you have other questions, you may contact my faculty advisor at UNCG, Dale Schunk, PhD at dhschunk@uncg.edu or call the Director in the Office Research Integrity at 336-256-1482 or 855-251-2351.

ASSENT

This study has been explained to me and I am willing to be in it.

_____ _____

Child's Name (printed) and Signature Date

Check which applies below *(to be completed by the person obtaining the assent)*

☐ The child is capable of reading and understanding the assent form and has signed above as documentation of assent to take part in this study.

☐ The child is not capable of reading the assent form, but the information was verbally explained to him/her. The child signed above as documentation of assent to take part in this study.

_____ _____

Signature of Person Obtaining Assent Date

UNCG IRB
Approved Consent Form
Valid from:
3/12/15 to **3/11/16**

APPENDIX D

FOLLOW UP TELEPHONE SCRIPT

Follow up telephone script for research study entitled: The Effects of an SRSD-Based Writing Intervention on the Writing Self-Efficacy, Writing Apprehension, and Writing Performance of High School Students: A Mixed Methods Study

Hi,

My name is Kathy Griswold. I am calling to follow on whether or not you received a packet containing details of a research study I am conducting at Bishop McGuinness High School. You should also have seen the study mentioned in your student's science class syllabus. Did you by chance receive it?

If no: May I please confirm your address so I can send another.

Thanks, I will get that out immediately and you should expect to get it within the next two days. When you receive it, is it possible for you to take a look at it and get it back to me by (day five business days from day of call)?

If yes: If you give permission for your child's data to be used, would you mind filling it in and sending back in with your student by (fill in day within 2 business days from call)?

If you do not wish for your child's data to be used for research, you do not need to complete this form.

Remember, all students will be in the classroom receiving the instruction and will be required to complete the assignments to earn the extra credit (up to 8 points for the semester). However, please know that whether or not you allow me to use your student's data for my study is entirely up to you. Please know that every effort will be made to ensure confidentiality and I can see no potential danger to your student that could arise as a result of my using his or her data.

I would like to thank you for your time and I look forward to hearing from you. Please remember. You can contact me at any time with questions or concerns.

Goodbye.

APPENDIX E

DEMOGRAPHICS QUESTIONNAIRE

Research Study - General Information

***Please read and fill out as requested*.**

Purpose: The purpose of this mixed methods study is to test the impact of an intervention program designed to improve high school students' self-efficacy for writing research papers, increase the use of self-regulatory strategies, reduce anxiety related to writing, and as such improve the quality of research papers. The intervention will provide the tools necessary for planning, organizing, and executing the complex writing assignments students are charged with in high school and in the postsecondary setting.

Confidentiality:

- You will not be identified by name in any written documentation related to this study. The only people who may know your identity are members of the research team. A pseudonym (fake name) will be used.
- All information related to the study will be confidential and kept in a secured location

1. What is your name? _____
2. What is your age? Years: _____ Months: _____
3. What is your gender? Male Female

4. What is your ethnicity (optional)?

   Caucasian

   African American

   Hispanic

   Asian

   Mixed

5. What grade were you in last year?
6. What grade are you currently in?
7. What English class were you enrolled In last year and what grades did you make:

   Semester I: ____ Semester II: ____

8. What classes are you currently enrolled in:
9. Would you be willing to participate in interviews? (please circle) Yes No
10. If yes, please provide contact information below:

    Phone number: _____ Email: _____

APPENDIX F

SELF-EFFICACY FOR WRITING SCALE

Self-efficacy for Writing Scale, adapted from Pajares, Hartley, and Valiante (2001) and the Self-efficacy for Writing Scale (Mills, 2010).

Name: _____

Directions: Below are twenty statements that people sometimes make about themselves. Please indicate whether or not you believe each statement applies to you by marking whether you:

Strongly Disagree = 1
Disagree = 2
Neutral = 3
Agree = 4
Strongly Agree = 5

Remember: There are no correct answers, only give your honest response to each item. Thank you for your participation!

____ 1. I know how to select a good topic to research and write a paper on.

____ 2. I know how to choose good sources for research purposes.

____ 3. I know how to conduct and organize research.

____ 4. I can write a strong *paragraph* that has a good *topic sentence* or *main idea.*

____5. I can write a *well-organized* and *sequenced paper* with good introduction, body, and conclusion.

____ 6. I can structure paragraphs to *support ideas* in the topic sentences.

____ 7. I can effectively use transition statements throughout my papers.

____ 8. I can get ideas across in a clear manner by staying focused without getting off the topic.

____ 9. I am able to start writing research papers without any difficulty.

____10. Even if I don't like a topic, I will still be able to write a good essay about it.

____ 11. I can make a well-organized outline for a research paper.

____ 12. I can write a good thesis statement on a research topic.

____ 13. If I get stuck while I am writing, I am able to find ways to overcome the problem.

____ 14. When writing a research paper, I know how to provide support for my thesis.

____ 15. I can write a good essay on any topic I have learned about.

____ 16. I will be able to rewrite my confusing sentences clearly.

____ 17. When writing an essay, I will be able to cite my sources correctly in MLA format.

____ 18. I can format a works cited page correctly

____ 19. I know how to revise my first draft of a paper to make a better-organized essay, free of superficial errors.

____ 20. I know how to manage my time effectively to finish long papers on time, without becoming overwhelmed.

APPENDIX G

WRITING APPREHENSION TEST

The Writing Apprehension Test (WAT) (Daly & Miller, 2013)
(http://www.midss.org/sites/default/files/writing_apprehension_test.pdf)

Name: _____

Directions: Below are twenty statements that people sometimes make about themselves. Please indicate whether or not you believe each statement applies to you by marking whether you:

Strongly Disagree = 1
Disagree = 2
Neutral = 3
Agree = 4
Strongly Agree = 5

Remember: There are no correct answers, only give your honest response to each item. Thank you for your participation!

_____ 1. I avoid writing.

_____2. I have no fear of my writing being evaluated.

_____ 3. I look forward to writing down my ideas.

_____ 4. My mind seems to go blank when I start to work on a composition.

_____ 5. Expressing ideas through writing seems to be a waste of time.

_____ 6. I would enjoy submitting my writing to magazines for evaluation and publication.

_____ 7. I like to write my ideas down.

_____ 8. I feel confident in my ability to clearly express my ideas in writing

_____ 9. I like to have my friends read what I have written.

_____ 10. I am nervous about writing.

_____ 11. People seem to enjoy what I write.

_____ 12. I enjoy writing

_____ 13. I never seem to be able to clearly write down my ideas.

_____ 14. Writing is a lot of fun.

_____ 15. I like seeing my thoughts on paper.

_____ 16. Discussing my writing with others is an enjoyable experience.

_____ 17. It is easy for me to write good compositions.

_____ 18. I don’t think I write as well as most other people do.

_____ 19. I like my compositions to be evaluated.

_____ 20. I am no good at writing.

APPENDIX H

MICROANALYTIC QUESTIONS

Self-efficacy Attributions Goals-strategy choice Apprehension

Microanalysis #1

OK, before we start the pretest, I'm going to ask you a few quick questions. Please write each response in the appropriate space.

Q.1 "How self-confident do you feel in your capability to write a research paper on a Marine Science topic and why do you feel that way?"

Q.2. "Do you have any specific plans on how you will write this research paper?"

If yes: Can you tell me about them?

If no: Do you have any particular methods in general you use when writing a research paper? Can you tell me about them?

Q.3. Do you have a goal when writing a research paper? If so, what is it?"

Q.4 "What do you need to do to accomplish that goal?"

Q.5. "How do you feel after you receive a grade for a research paper and why do you feel that way?"

Q.6. "What grade (in percent) will you set as your goal for this pretest?"

Ok, great, thank you – you may start.

Microanalysis # 2

After pretest feedback

Q.1. How does the grade you received on the pretest compare with the goal you predicted? (Calibration)

Q. 2. If different, why do you think there was a difference? (attributions)

Q. 3. If you could take this pretest again, what, if anything, would you do differently? (feedback loop?)

Microanalysis #3

After intervention, during group practice

Q.1.1. Can you please stop for just a second and tell me what you were doing just now

Q.1.2. and why?

Q.2.1. Is this something that you typically do when writing a research paper

Q.2.2. (yes) If yes, please explain.

Q.2.2. (no) If not, what do you typically do?

Q.3.1. Can you please tell me what you plan to do next,

Q.3.2. and why?

OK, thanks. You may continue now.

Microanalysis # 4

Before Post-test

May I repeat Qs 1-4 from beginning?

Q.1. “How self-confident do you feel in your capability to write this research paper on a Marine Science/Zoology topic?

Q.2.Why do you feel that way?”

Q.3. “Do you have any specific plans on how you will write this research paper?”

Q.4. Do you have a goal when writing this research paper? If so, what is it?”

Microanalysis # 5

After posttest

Q. 1. How do you feel as you hand this paper in to be graded?

Q. 2. How confident do you feel this essay will earn a grade of C or better? Why do you feel that way?

Q. 3. How confident do you feel that you wrote a clear and arguable thesis statement and why do you feel that way?

Q. 4. "How self-confident do you provided critical and

relevant support for your thesis and why do you feel that way?"

Q. 5. What if anything did you differently from the pretest?

If did things differently, please explain why you did things differently.

If did things the same, please explain why.

Q.6. How do you feel about having this paper graded? Why do you feel this way?

APPENDIX I

SRSD WRITING INTERVENTION LESSONS

Lessons adapted from Harris, Graham, Mason, and Friedlander (2008)

Lesson 1

Ties in with Stage 1 – Develop background knowledge

Lesson Overview

The purpose of Lesson 1 is to develop student background knowledge and to discuss strategies that will be taught.

Student Objectives

Students will describe verbally what a research paper is and what traits make a research paper good. Students will be able to articulate a process of writing a research paper. Students will be able to define key vocabulary. Students will understand the concept of a working outline.

Materials

Writing folder, notebook paper, pencil, Vocabulary Terms Worksheet

Set Context for Student Learning

Inform students that they will be learning a new process and accompanying strategies to help them write the types of research papers that will be expected of them in higher level high school classes and college. Let them know there are terms they must know and understand which are essential to success with the task.

Develop the Strategy and Self-Regulation

Step 1: Develop Background Knowledge

I. Discuss goal setting and explain how setting and monitoring goals improves motivation, attention, and effort. Help students understand how setting goals prior to beginning a task helps define the task at hand, which in turn facilitates optimal planning and strategic action

II. Discuss the role of planning in major assignments and life in general
III. Define and review the following concepts/key vocabulary – fill in Vocabulary Terms Worksheet

- Thesis statement
- Parenthetical documentation or citations
- Works cited
- Research (quality)
- Topic sentence
- Transition
- Plagiarism
- Paraphrase
- MLA
- Easybib.com

IV. Describe what makes a strong research paper – specifically ensure students understand that a good research paper:

- is thesis-driven
- contains quality facts and evidence/support
- is logically organized
- contains adequate sources – which are cited correctly
- contains common elements they will be learning about

Step II: Introduce Working Outline Strategy

I. Explain all good research papers contain 4 basic elements:

- A strong thesis statement at the end of the first paragraph
- An introduction
- Body paragraphs (containing topic sentence, relevant facts, and transitions)
- A conclusion

II. Knowing these elements enables students to create working outlines to help create structure and organization for research papers

III. A working outline is like a puzzle – once you complete the outline, it is easier to fill in the parts - compare the outline to a puzzle

- Certain pieces provide clues to other pieces, like topic sentences and transitions
- As you add more pieces, the puzzle nears completion
- If all pieces not placed correctly, puzzle not work out

Step III: Find 4 Basic Elements in Research Paper

I. Let students know they will be reading a research paper written by a former student to see if the paper contains the 4 basic elements (thesis statement, introduction, body paragraphs, conclusion)
II. Each student will follow along or students can read aloud; students should raise their hands when they recognize one of the 4 basic elements. As each element is identified, discuss. As students identify each of the 4 elements, create, retroactively, an outline.
III. When activity completed, show how puzzle analogy makes sense
IV. Ask students to reflect on how their pre-tests did or did not contain the essential elements discussed.

Step IV: Practice

I. Practice vocabulary (scaffold as necessary) until all are familiar enough to move on
II. Practice identifying 4 basic elements of a research paper (scaffold as necessary) until all are familiar enough to move on

Wrap-Up

Let students know that there will be an oral test during the next meeting to ensure they are all ready to move on to the next lesson.

Modifications: Older students may be able to read the sample essay to themselves, after which, the instructor can ask questions asking students to identify key components of the essay.

Vocabulary Terms Worksheet –HO #1

Thesis statement	
Parenthetical citations	
Works cited	
Research (quality)	
Topic sentence	
Transitions	
Plagiarism	
Paraphrase	
MLA	
Easybib.com	

Vocabulary Terms Worksheet

Thesis statement	A single sentence that formulates both your topic and your point of view; the answer to the central question or problem you have raised (MLA handbook 1.8.2.
Parenthetical documentation (citations)	When you provide a brief parenthetical acknowledgement in your paper wherever you incorporate another's words, facts or ideas (MLA Handbook 6.1.). Basically giving credit where credit is due. What you refer to must specifically refer back to the Works Cited page.
Works cited	A list containing all of the sources you used in your paper. It appears at the end of your paper on its own page ideas (MLA Handbook 5.3.1.).
Research (quality)	Gathering information from credible and quality sources on a topic. Quality: Consider the source.
Topic sentence	The first sentence of a paragraph that expresses the main idea in the paragraph.
Transitions	Words or phrases that connect one idea to another in a smooth and coherent way.
Plagiarism	From the Latin plagiaries (kidnapper), plagiarizing is committing "literary theft." It can be presenting ideas from other sources as one's own ideas or failing to to give credit where credit is due (MLA Handbook 2.1.). It can be intentional or unintentional (2.4).
Paraphrase	Putting information into your own words. Note: you must still cite your sources.
MLA	The Modern Language Association of America. It represents a consensus among teachers, scholars, and librarians in the fields of language and literature on the conventions for documenting research (MLA Handbook) xiii).
Easybib.com	An online tool to assist with keeping track of sources, citing sources correctly, and formatting a Works Cited page.

Lesson 2

SRSD

Lesson Overview

The purpose of Lesson 2 is to introduce students to the PLANTOS strategy to help them plan, organize, and write quality research papers.

Student Objectives

Students will identify and memorize goals for writing research papers using the PLANTOS strategy.

Materials

Student folders, PLANTOS mnemonic chart, PLANTOS GOALS CHART, Goals worksheet, Working Outline Road Map, Working Outline Template, Editing Checklist, pencils, notebook paper

Set Context for Student Learning

Start a discussion on what it means to students to plan—make real-world, meaningful connections (e.g. sports, parties, weddings, vacations etc.). Share examples of how, as in other scenarios, planning makes the writing process smoother—making papers more organized—even longer. Inform students of the intention to teach them a strategy to write research papers they can use for writing any genre of essay from personal narrative to opinion pieces to in-depth research papers.

Develop the PLANTOS Strategy and Self-Regulation (modified from PLANS by Harris, Graham, Mason, and Friedlander, 2008)

Step 1: P for "Pick Goals"

I. Give students copy of PLANTOS mnemonic chart
   - Tell students that before they start any part of the writing process, they need to figure out what they want to do: that is PICK GOALS for the paper. Goals should direct what you do throughout the entire writing process. Before setting goals, tell students they should always look over the assignment, including any rubric, carefully, so that their goals mirror what the instructor's goals are.
   - For example, if your teacher asks you to write a paper about a topic you studied in your Marine Science or Zoology class and you write an overview of all that you studied – you'll be in trouble. Before you start,

you must have in mind the topic you want to write about, and more specifically what aspect of the topic you want to cover. It is important to narrow down your topic, even select an angle to work from. For example, while it would not be ideal to write about coral reefs or endangered species in general, you could write about the human impact on coral reefs or specific endangered species.

- Picking Goals helps you narrow down and define exactly what you want to write about (i.e. what is the purpose of your paper?) – this is a critical first step in the writing process.

II. Brainstorm different types of goals that could be set during the writing process

- Purpose
- Careful attention to directions
- Making sure you address all aspects of a rubric
- Length
- Grade
- Note: Some goals could apply to any type of writing, while others, such as a persuasive piece, might be more specific (e.g. to convince school administration to abandon school dress-code policies)

III. Provide students with a copy of the PLANTOS GOALS CHART and tell them to keep it and refer to it anytime they are assigned a writing assignment. They should understand that they can and should create their own goals, as necessary, based on the model goals provided.

IV. Review all goals on PLANTOS GOALS CHART and ensure all students understand that each time they reference the chart, they should pick one goal from sections A, B, and C.

V. Brainstorm with students which goals from the PLANTOS GOALS CHART would be appropriate for writing a research paper and have students write the goals on the PLANTOS worksheet

VI. Explain/discuss the logic behind each choice until understanding by students is accomplished

VII. Let students know that the ultimate goal of this exercise is that everything becomes internalized and automatic.

Step 2: L for "List Ways to Meet Goals"

I. Refer to PLANTOS mnemonic chart and explain that once goals are set, it is important to think of ways one can meet or accomplish their goals. Ask students if they think it is more likely to meet goals arbitrarily, by chance, or through deliberate planning.

II. Underneath each goal on the PLANTOS GOALS CHART, have students brainstorm, then list corresponding goals on the Goals Worksheet. If students come up with illogical goals, discuss why not appropriate and come up with alternative goals that make more sense given the task at hand

Step 3: A – explain not stand for anything – just there to make mnemonic work

Step 4: N for "Make Notes"

I. Once there is a plan in place, it is time to gather research and make notes.

II. Discuss using note cards as an organizational tool – will go into more detail later

III. Let students know that while we will be using note cards, at some point, they may prefer to organize their research on a Word document, Google Doc, spreadsheet etc. It will be up to them to find a means of organizing their research that works for them

Step 5: T for "Generate a Thesis Statement"

I. Recall/discuss what a thesis statement is

II. Discuss why one might come up with a thesis statements after conducting some general research or if had one in mind, might consider changing

Step 6: O for "Outline"

I. Hand students Working Outline Road Map and review

II. Debunk the 5-paragraph essay myth and elaborate

III. Discuss Working Outline Road Map and check for understanding

IV. Hand students Working Outline Template and let them know they will type at a later date. They can keep the template in a file on their PCs and use "Save As."

Step 7: S for "Sequence Notes for Outline"

I. Once students have all of their information gathered and an outline prepared, they can go through their research and decide where each piece of information belongs relative to the outline

II. Students will label each note card with corresponding number from outline (I-V) and put in piles accordingly (clip or rubber band) – will demonstrate later

III. Explain the goal of this is to provide an additional layer of structure and organization to assist in the next, writing stage

End planning phase

Step 8: Write and Elaborate

I. Brainstorm with students how and why following the steps above should make writing the paper easier

II. Make clear to students how the combination of good notes and outlines give them the 'meat' of what they need to write their papers

III. Model how the paper can be written directly into the outline and numbers and letters can be deleted as they go

IV. Ask students to define elaboration and discuss until understanding is evident

V. Discuss the "Elaborate" aspect and how everything written must loop back to the thesis statement or it is off-task or irrelevant

Step 9: Test Goals

I. This is the time to go back and reread paper and make sure all goals met

II. Students should refer to Goals worksheet and check off all goals they met

III. Unmet goals should be noted and addressed

Step 10: Edit and Review

I. Discuss pros and cons of editing (self, peer, teacher, etc.)

II. Hand out editing checklist – peers can use as guideline to point our potential issues and students can use themselves to make revisions and improvements to their papers

III. Have students articulate any opposition they may have to this step

Encourage students to commit these steps to memory

PLANTOS

P = Pick Goals

L = List Ways to Meet Goal

A = AND

N = Make Notes

T = Thesis Statement

O = Outline

S = Sequence Notes for Outline

Write and Elaborate

Test Goals

Edit and Review

PLANTOS Goals Chart

A. _____ Write a paper that will teach the readers

_____ Write an essay that shows readers understanding of a topic

_____ Write about a personal narrative

_____ Write a story designed to entertain readers

B. _____ Write a thesis- driven research paper that has all 4 basic elements

_____ Write an analytical paper

_____ Write a personal narrative

_____ Write a piece of fiction

C. _____ Write a paper that is 2 pages or longer

_____ Write a paper that is 3 pages or longer

_____ Write a paper that is 4 pages or longer

_____ Write a paper that is __ pages or longer

Other goals:

Goals Worksheet

PICK GOALS:

1. 2. 3.

Other:

LIST WAYS TO MEET GOALS:

1. 2. 3.

Other:

Working Outline Road Map

Thesis statement:

I. Introduction

   a. Start broad/more general

   b. Funnel down

   c. Insert thesis statement at end of introduction

II. Body paragraph 1

   a. Topic sentence related to part 1 of thesis statement

   b. Detail and evidence (include parenthetical citation)

   c. Detail and evidence (include parenthetical citation)

   d. Detail and evidence (include parenthetical citation)

   e. Concluding statement to paragraph 1

   f. Transition to part 2 of thesis

III. Body paragraph 2

   a. Topic sentence related to part 2 of thesis statement

   b. Detail and evidence (include parenthetical citation)

   c. Detail and evidence (include parenthetical citation)

   d. Detail and evidence (include parenthetical citation)

   e. Concluding statement to paragraph 2

f. Transition to part 3 of thesis

IV. Body paragraph 3

a. Topic sentence related to part 3 of thesis statement

b. Detail and evidence (include parenthetical citation)

c. Detail and evidence (include parenthetical citation)

d. Detail and evidence (include parenthetical citation)

e. Concluding statement to paragraph 3

f. Transition to conclusion

V. Conclusion

a. So what?

b. Bring it all together

c. Restate thesis in an original way

d. Leave audience with something further to consider

Working Outline Template

Thesis statement:

I. Introduction

a.

b.

c.

d. Thesis:

II. Body paragraph 1

a.

b.

c.

d.

e.

f.

III. Body paragraph 2

a.

b.

c.

d.

e.

f.

IV. Body paragraph 3

a.

b.

c.

d.

e.

f.

V. Conclusion

a.

b.

c.

d.

Lesson 3

Lesson Overview

Lesson 3 provides an opportunity for the teacher to model the PLANTOS strategy, including the use of detailed self-statements. The demonstration will be interactive and students will assist in writing part of a research paper, while practicing what they have learned thus far. Once the demonstration is complete, students will come up with their own self-statements to assist them with the writing process.

Student Objectives

Students will demonstrate memorization of the PLANTOS strategy. Students will observe and participate in the PLANTOS strategy in action. Personalized self-statements will be brainstormed and written to reflect individual needs and styles.

Instructor and students will share the process – create thesis, make notes, use Working Outline Templates and Road Maps.

Materials

Student folders PLANTOS mnemonic chart, sample note cards, note cards, PLANTOS GOALS CHART, Goals worksheet, Working Outline Road Map, Working Outline Template, Self-Statement Table, MLA checklist, pencils, notebook paper

Set Context for Student Learning

Test students to ensure mastery of steps. Help should be provided as necessary. Have an open discussion about what each step entails and ensure that students are able to articulate an understanding of each step. Wrap up discussion by addressing any questions.

Further Develop the Strategy and Self-Regulation

Inform students they will be shown, step-by-step how to use the PLANTOS strategy to help them plan and prepare to write a research paper. Remind them the strategy can be tailored to almost any kind of writing they will encounter in high school, college, and even graduate school.

Let students know that as the strategy is demonstrated, any problems with definitions, planning, self-evaluation, and self-evaluation thoughts experienced will be verbalized. Explain how the messages we give ourselves as we work can be either helpful or harmful. Ask students to provide examples of self-statements that can be helpful and harmful.

Work through the entire process, using reinforcing self-statements throughout. Select the human impact on the environment as the topic and have the PLANTOS mnemonic chart visible so students can follow along as each step is encountered and executed.

Select a science-related research topic (e.g. the human impact on the environment).

As each step in the mnemonic is dealt with, think aloud starting with a definition of the problem. Explain how the human impact on the environment is a huge topic, one which must be narrowed down. Brainstorm aloud ways to do that (e.g. thinking about what you know, doing research etc.). Also remind students to consider the audience when choosing a topic and to consider the pros and cons of selecting a controversial topic.

Before starting, say: *Before I start even thinking about my strategy, I need to understand what I am being asked to do. I am going to read the assignment and rubric, if one is provided, and think about it for a few minutes. If I have any questions, I am going to write them down so I can ask my instructor.* Read the planned assignment/topic and model (by thinking aloud) defining the problem etc. Discuss to ensure all students understand what is being asked.

P is for Pick Goals -Say: *To help me get started, I am going to write down the PLANTOS steps on a piece of paper. I think this will help me get focused and help me start to think about what I need to do. I will also use the Goals worksheet to keep track of my goals, jot down how I decide to reach my goals, and to make notes on. I know the P in PLANTOS stands for "Pick My Goals." I remember I am supposed to pick a goal from each section on my PLANTOS Goals Chart.* Point to each goal in each section and think aloud about whether or not each goal will help me reach the objective of writing a research paper and select goals as appropriate – have students select goals (teach, thesis-driven, 2-pages) and correct if necessary. *Now that I have chosen my goals, we will write them down on the top of the Goals worksheet.*

OK – so we know a research essay is intended to teach the audience, must be thesis-driven, and we want in to be at least 2-3 pages. I think all of my goals are important, what is the most important goal to you (discuss). I think goal number 2 is the most important as it dictates exactly what the paper will be about. OK good, we have made it through the first step and done pretty well. I think we are ready and organized to begin the next step!

L is for List Ways to Meet Goals – Say: *Now that I have my goals down, I need to come up with ways to achieve my goals. I know that it will be hard to reach my goals without a plan. I think it is a good idea to have at least one way in mind, maybe more, to meet each goal I have listed.*

Our first goal is to teach readers. Well since I only know a lot of general knowledge about the human impact on the environment and the assignment asks us to cite where the

information comes from, we need to learn more about the topic before we even start to think about actually writing the paper. What are some things we could do to learn about the how humans impact the environment? Suggestions - books, the internet – we need to do some research and make notes. If we do this, we can be sure we know what we write is accurate and we will reach the goal of teaching readers. We know we must have at least 3 sources, so we will be sure to do that: What about using 4! Do you think teachers might be impressed if you go over and above?

Our second goal is to make sure the paper is thesis-driven and contains the four basic elements we learned about (strong thesis statement, an introduction, body paragraphs - containing a topic sentence, relevant facts and transitions - and a conclusion). OK. This sounds like a lot of work, but we can do this. We know what all of these things are, we know a strategy for breaking this process into manageable pieces: this is doable. You could probably just write 2-3 pages from what you have learned about how humans impact the environment in class, on the news, and from your parents, etc., but then you would likely get a low grade. We need to stay focused and follow all the steps. To reach this goal, after we have learned more about the topic and narrowed it down, we can write a thesis and then use the outline template. If you recall, the thesis fits onto the outline sort of like puzzle pieces fit together. This goal is a little stressful, but we can do it: We just need to slow down, resist cutting corners, and remember the steps. We know once we get that outline filled out, it will be much easier!

Our third goal is to make the paper at least 2-3 pages long. We know we need an introduction and a conclusion, and we know we will have 3 topics from the thesis statement to write about. If we write one paragraph with at least 6 sentences for each of these, we should be good. We can always adjust up or down as we go if we need to. OK so this looks like it will be a 5 paragraph essay. I know we can do that. Take time to think aloud how we could almost double the length of the paper by writing 2 paragraphs instead of one about each part of thesis.

N is for Make Notes – Say: *Now that we have all of our goals listed, we need to start pulling together all of the information we need. What would be a good starting point? I think we should start by finding some good sources to learn about the topic and make notes from. We can also think about a thesis statement as we read about it. The internet is a great resource, but since anybody can put something on the internet, how do we know what sources are good? Well, we know to stay away from Wikipedia since anybody can change those sites. I remember the assignment requires a properly formatted works cited page: easy.bib makes that easy. We are going to remember to use that so I can keep track of which sources we use and to learn how to cite them in a paper. We don't want to have to go back after writing the paper and try to remember where we got all of the information from. I am pretty sure any of us would forget a lot! Sticking with the strategy will help keep all notes and sources organized.* On the PC/projector, model putting sources into easybib.com.

Add research phase and make thesis.

On the board, model making a note cards with facts, including relevant parenthetical information. As note cards made, think aloud about narrowing down the topic and about possible angles for a thesis statement. Remind students to paraphrase during the note taking stage to help prevent plagiarism and to help make writing the paper easier.

Have all students make a note card from
http://www.nationalgeographic.com/eye/impact.html

T is for Generate a Thesis Statement – Say: *Man, making all of those note cards took a long time, but you have to admit, we learned a lot about the human impact on the environment and we pretty much know where to go from here. Even though that seemed like a lot of work, I think it was worth it. Now we need to come up a thesis statement. We learned that coming up with three ideas to discuss about my topic will help organize the paper. I think some of the most important things we learned about the human impact on the environment include: for the most part, humans have been destroying the planet, and that some of the main ways include pollution, deforestation, and overpopulation. These three issues themselves would be perfect for constructing a thesis statement that has three parts. I am going to highlight each part to help me see things more clearly.* Model rereading and improving thesis as necessary and highlight each part as you identify it.

While there are many ways people negatively impact the earth, pressing issues that must be addressed include, pollution, deforestation, and overpopulation.

This has three clear parts, all of which I can write about. I think this will work well.

O is for Make an Outline – Say: *Now that we have a thesis statement, we should be able to fit in nicely onto my Working Outline template.* Open Working Outline Template on projector and think aloud as you fill it in. *First let's add my thesis statement at the top. I like to keep the highlighting because it helps me see all the parts clearly.*

S is for Sequence My Notes for Outline – Say: *Before we start filling in the rest of the template, I think we need to organize our note cards a little better so that they follow or match up with the outline. I think it would make sense to go through the note cards and put them into piles according to where they might fit on the outline. We need an introduction pile, a pile to go with each part of the thesis, so 3 more piles, a conclusion pile, and maybe a miscellaneous pile.* Model sorting the note cards and thinking aloud the process of where each card will go. Make some errors and model the correcting process. Some may fit in one or more piles – think aloud how to decide which is the best fit. Tell students that they should rubber band or clip each pile.

I think we are done with most of the planning part. That seemed like a lot of work, but each step was totally manageable. We just need to remember to take it step-by-step so we don't get overwhelmed or tempted to skip steps. We know exactly what we need to do now. It's time to start writing!

Self-Statements

Say: *As we went through the process, you probably noticed that I talked out loud. Doing this helped me prepare to write a better paper and will help me when I start writing the paper. For example, when I started to feel overwhelmed, I said things to help me calm down and refocus such as, "I know I can do this." I also reminded myself why I was taking the time to go through all of the steps. Saying these things helped me stay on track and stay positive. They also reminded me that I know what I am doing. When we have big projects or assignments, it is easy to become overwhelmed. Saying or thinking positive things is a way to counteract these feelings. On the other hand, saying or thinking negative things can make things worse and even make you shut down or give up.*

Have students brainstorm different types of positive self-statements that might help them when they must write a research paper. Remind them that they can say them or just think them. Ask them to fill out the Self-Statement Table with statements they think could help counteract each of the thoughts listed.

Say: *Now that I am done with my research and I have my thesis statement, I can get to work writing my paper. I know I can and should use the Working Outline Template to write my paper on, because it will help me stay focused and remind me to include everything. I will keep my Working Outline Road Map next to me so I can make sure I have everything I need.*

Work through each part of the Working Outline Template, starting with the introduction.

I. Introduction - Think aloud as you model the process in order to show students how the introduction is like a funnel that starts broad and narrows down. Say: *So I have learned that my introduction should start with a broad introduction of my topic. Although the human impact on the environment is my actual topic, the bigger topic is the environment. I think I should mention the importance of the environment to humanity, yet humans continue to act in ways that are detrimental to the environment to provide some background – maybe about 3 or 4 sentences worth. Let me think about what I know and whether or not I need to do a little more research. I know there are several ways that humans are damaging the planet and that there are things that could be done to slow or reverse the damage.* …Think aloud as you come up with some environmental facts and how to decide if more research is in order. If it is, model thinking process as you decide what to include, how to find it, cite it, add to works cited page etc. *Ok now that I have some facts on the*

human impact on the environment to introduce the bigger topic, I need to start to funnel down to the three issues I plan to focus on. I could do that by writing something like: The human impact on the environment is far reaching, and for the most part negative.– that would be a good first sentence – it is broadly related to the topic, but starts the funneling down process.

II. Body Paragraph 1 – Think aloud as you come up with a topic sentence related to the first part of the thesis statement. Say: *I know the body of my paper must follow my thesis statement so the topic sentence for my first body paragraph should be directly related to the first part of my thesis statement. I can pretty much say the same thing, just in a different way. The point I am trying to prove is that pollution is a chronic environmental issue.* Model writing a topic sentence for body paragraph 1 onto Working Outline Template. Say: *Now I have my topic sentence, I need to get my notes out that are related to this topic and start to fill in the facts. Let me look through what I have and make sure they all relate to pollution. They all look good, now I am going to put them in the order I want them to come.* Think aloud as you fill in the details and then show students how to connect the sentences by using transitions, linking words, varied sentence types etc. Say: *Now that I have everything down I want to say about the negative impact of pollution on the environment, I need to write a sentence that pulls it all together—the sort of 'so what' of the paragraph- that is the sentence that will go where it says Concluding statement to paragraph 1.* Think aloud as you think about the 'so what' of the paragraph. After you have come up with a satisfactory sentence, Say: *All I have left is the transition to the next body paragraph. Now why is there a transition here again? Oh yeah, it is what will prepare my readers for a shift from one topic to the next.* Think aloud as you discuss parts 1 and 2 of thesis statement, how they are connected, and how you can prepare readers for the change. Example: While pollution is a serious problem that impacts the environment all over the world, deforestation, although more geographically specific, is also a serious threat to the environment. See if students can see how that works versus just listing facts.

III. Body paragraph 2 - Tell students that they will write the next body paragraph themselves using the same steps and strategies they just saw modeled. Let them know that you are there for help but that you would like them to refer to all of their resources, including using self-statements prior to asking for help. When students ask questions, probe to ensure they followed the steps and ask them about self-statements. Brainstorm with them if necessary.

IV. Body paragraph 3 - Tell students that they also will write the last body paragraph themselves using the same steps and strategies they just saw modeled. As before, let them know that you are there for help but that you would like them to refer to all of their resources, including using self-

statements prior to asking for help. When students ask questions, probe to ensure they followed the steps and ask them about self-statements. Brainstorm with them if necessary.

V. Conclusion – Say: *Well, I am pretty much done. The most challenging part I have left is the conclusion. Before I start, let me remind myself what I know about a conclusion: it is basically the 'so what' of my paper: it pulls it all together. I need to try to bring everything together, without sounding repetitive and I need to restate my thesis in a slightly different way. This sounds like a lot, but I just need to take it one step at time and I will be fine.* Model and think aloud as you write a conclusion. Remind students not to bring up anything new, but they can leave the reader with something to think about, something deeper.

Pulling it All Together:

Say: *Now that I have all of the pieces of my puzzle filled in, I need to take out all of the Working Outline numbers and make it look like a formal research paper.* Remove all template items and make sure all paragraphs are indented correctly.

Say: *Now that I have the paper all together, I need to check my MLA formatting. I will use my MLA checklist to double check that everything looks the way it should: I don't want to lose any points for something that is easy to fix!* Model the process of going through the list and checking off each point as you ensure it is correct. Show how each step is completed as all students may not be familiar with how to perform all operations in MS Word.

Say: *Alright, I'm almost done. I could, in theory hand this in like it is. I have worked really hard on it and spent so much time on it already. But I know from what I have learned that editing is important. I guess it would be pretty silly to lose points on little things like typos and other mistakes I can catch myself. Also, I think I will also ask somebody else to read it and get more feedback. If I do all that and make some changes, I will know I have done the best I can.*

Tell students that in the next lesson they will learn about some things to look out for when they are editing their own papers.

Working Outline Template

Thesis statement: The human impact on the environment is far reaching, and for the most part negative. While there are many ways people negatively impact the earth, pressing issues that must be addressed include: pollution, deforestation, and overpopulation.

VI. Introduction

a. The human impact on the environment is far reaching, and for the most part negative.

b.

c. While there are many ways people negatively impact the earth, pressing issues that must be addressed include: pollution, deforestation, and overpopulation.

VII. Body paragraph 1

a.

b.

c.

d.

e.

f.

VIII. Body paragraph 2

a.

b.

c.

d.

e.

f.

IX. Body paragraph 3

a.

b.

c.

d.

e.

f.

X. Conclusion

a.

b.

c.

Self-Statement Table

Negative	Positive
I don’t know how to start	
This is too much work	
I can’t focus	
I don’t know what to do	
Three pages seems like a lot to write. How will I ever be able to do that?	
I’m terrible at coming up with details.	
I can’t remember how to format a works cited page.	

MLA Checklist

___ Margins 1-inch on all sides

___ Last name and page numbers in header (insert page number, top of page, right justified)

___ All font Times New Roman 12 INCLUDING HEADER

___ Double-spaced

___ No extra spaces (paragraph, spacing = 0 before and after, check ‘Don’t add space between paragraphs of same style)

___ MLA heading format correct

John Smith (your name)

Ms. West (teacher name)

English I (class name)

7 July 2014 (date in this format – NO COMMAS)

___ Parenthetical citations included and formatted correctly

___ Works Cited page included as own page at end of paper

Lesson 4

Lesson Overview

Lesson 4 provides an opportunity for the teacher to model how to test goals, self-edit part of the research paper, and gives students the opportunity to practice what they learn.

Student Objectives

Students will observe the instructor testing goals and the self-editing process as the teacher reads through the paper and uses the Editing Checklist in an effort to improve the paper. Students will be encouraged to use peer and adult editors and to ask them to use the checklist provided.

Materials

A printed copy of the completed paper, Editing Checklist

Explain the benefits of using a printed copy to edit in addition to the software tools such as spell check.

Say: *Before I start reading my paper, I am going to read the goals set prior to writing the paper and the editing checklist so I know what to be on the lookout for. Then I am going to get a colored pen which I can see easily, and start reading right from the top. I promise myself I am not going to skip anything even though I am not that excited about doing this. It's not that much to read and it will save me from losing points on the little things.*

First, ask students what goals were and read the editing checklist. Say: *Now that I have a good idea in mind of what to look for, I can get started.* Next, start reading the paper aloud and then say: *I think I will read the paper out loud to myself and follow along with my pen. I think if I read it out loud, I can better hear how it sounds and I will be less likely to miss anything.* Keep reading the introduction, making marks as necessary. Check off items on the list as appropriate, noting, that many cannot be checked off until after you have finished reading the entire paper. Think out loud as you read and about the edits you find necessary, think through any improvements.

Say: *Now that I have finished reading the introduction you will read the rest of the paper on your own. When you are done, look at the editing list and make sure you thought about everything. Wait until after you have made the changes on my master document before checking off anything on my checklist.* Model and think aloud as you make the edits/changes decided upon on the master document. When all revisions are made, check one last time that the works cited page starts on its own page. Finally, go through Editing

Checklist and check off as appropriate. The paper can be split into groups by paragraph and a discussion should follow on editing and goals.

Lesson 5

Lesson Overview

Lesson 5 provides an opportunity for students to practice all steps of the PLANTOS strategy in small groups.

Note: Select groups prior to starting this lesson.

Student Objectives

In small groups, students will use the PLANTOS strategy to write a research paper.

Materials

Writing folder, assignment sheet, rubric, PLANTOS checklist, note cards, paper, pencil

Say: Now that you have learned a process strategy for writing a research paper, you are going to follow the process in pairs, with help from me.

Step 1 -> Pick Goals

Remind students that in order to pick goals, they must have a solid understanding of what is being asked of them. Ask students what they should do prior to starting the process strategy they have learned? They should say read directions and rubric. Discuss why this should be done and read both aloud.

With your partner(s) and using the Goal Sheet in your folders, the assignment sheet, and rubric go ahead and write down your goals. Discuss as a group, letting students they may add or subtract goals if it makes sense to do so based on what they hear.

Step 2 -> List Ways to Meet Goals

Now list ways you can meet the goals you have set. Discuss as a group, letting students they may amend if it makes sense to do so based on what they hear.

Step 3 A -> placeholder

Step 4 N → Gathering Notes

Say: *Now that you know more about how to conduct research, you are going to practice in your groups, but with me here to help you as you need it. Remember what we did when we worked together and the things I thought about and we discussed as we worked. You will spend about 10 minutes collecting general information on the topic and then we will*

practice coming up with thesis statements until you all have something you like. Remember as you do your research, make notes on note cards and think about and discuss with your partner what you want to focus on.
Don't forget to:

1. *Use easybib as you find sources you plan to use*
2. *Use your note card templates*
3. *Paraphrase as you go*

Give students time to look at sources and circulate, offering assistance as solicited. Make sure to reach out to students who look stuck. Constantly remind them about benefits of paraphrasing at this stage.

Monitor progress.

When students complete note cards and source cards, begin thesis statement brainstorming session.

Step 5 T -> Generate Thesis

Say: *At this point, you should all be a lot more familiar with the topic than you were before and be ready to start brainstorming thesis statement ideas. Based on what you learned about writing a thesis statement and what you now know about the topic, take about 5-10 minutes to come up with a thesis statement you think will work and then we will discuss your ideas.* Have the students volunteer thesis statement samples – help get them going if needed. Troubleshoot as necessary until a solid thesis statement is developed for each group.

N Say: *Now that you have a thesis statement, you will make the rest of the notes you think you will need to complete the assignment. Use note cards and easybib. Since this is a group assignment, you may wish to divide the work up.*

Step 6 -> Outline

Have ALL students create a Working Outline Template in MS Word and insert thesis at top.

Steps 7-10 will be done in groups with instructor circulating and assisting as necessary. Instructors are encouraged to engage groups in meaningful conversation about the process and what they are doing.

Step 7-> Sequence Notes for Outline

Step 8 -> Write and Elaborate

Step 9 -> Test Goals

Step 10 -> Edit and Elaborate