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The Impact of Reading Self-Efficacy and the Regulation of Cognition on the Reading Achievement of an Intermediate Elementary Sample

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THE IMPACT OF READING SELF-EFFICACY AND THE REGULATION

OF COGNITION ON THE READING ACHIEVEMENT OF AN

INTERMEDIATE ELEMENTARY SAMPLE

A Dissertation

Submitted to the School of Graduate Studies and Research

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Requirements for the Degree

Doctor of Education

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Title: The Impact of Reading Self-Efficacy and the Regulation of Cognition on the

Reading Achievement of an Intermediate Elementary Sample

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        The goal of the current study was an investigation of the relationship between

reading self-efficacy and regulation of cognition, important components in the

development of self-regulated learning, and reading achievement; the impact of the

demographic variables of age, student sex and socioeconomic status were also

considered. This quantitative quasi-experimental design utilized a sample of eighty-four

fourth, fifth and sixth grade students from a rural school district in North Central

Pennsylvania. The sample was one of convenience.

        Several conclusions are drawn from the results. Reading self-efficacy is a

predictor of both regulation of cognition and reading achievement in an intermediate

elementary sample. The finding supports the premise that students more efficacious

about their ability to read, tend to regulate their cognition at a level significantly different

from those lower in reading self-efficacy. While positively associated with reading

achievement, a significant relationship between regulation of cognition and reading self-

efficacy does not exist.

        Several conclusions regarding the impact of age, sex and socioeconomic status

can be drawn. Results of the current study support the positive relationship between age

and regulation of cognition. In the current sample, older students displayed significantly

better ability to regulate cognition as measured by the *BRIEF* (Gioia, et al., 2000). Significant sex differences among boy's and girl's level of regulation of cognition and reading achievement were revealed. Girls displayed significantly higher levels of both regulation of cognition, specifically working memory, monitor and organization of materials than boys. Girls also displayed significantly better reading achievement. While Pajares (2002) reports sex differences with girls displaying more self-regulatory behavior than boys, the current study increases our understanding within this age group. Socioeconomic status, specifically maternal education, was a significant predictor of reading self-efficacy and regulation of cognition.

ACKNOWLEDGEMENTS

worked on his paper. Your Dad is done now. What should we do? Go sailing, biking,

fishing, or camping…..just name it!

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CHAPTER 1

INTRODUCTION

The scope and purpose of the educational process has changed considerably in the last century. Historically, educators have attempted to transfer the knowledge base of one generally agrarian generation to the next. Currently, educators are faced with the task of equipping students to succeed in an era of transition. As the decline of the industrial age in the United States leads to the burgeoning of the information age in a flattening world economy, the need for students to be true life long learners has never been more apparent. Yet Grigg, Daane, Jinn, and Campbell (2003) found that 50% of students cannot read at grade level with rates reaching 66% in minority populations.

> The issue of poor reading has been noticed by policy makers and
> elevated as a national concern. It goes without saying that the
> failure to learn to read places children's futures and lives at risk for
> highly deleterious outcomes. It is for these reasons that the
> National Institute of Child Health and Human Development
> [NICHD] considers reading failure a national public health
> problem.. (Hearing on Measuring Success: Using Assessments and
> Accountability, 2001; Sweet, 2004, p. 13).

Self-Regulation

The No Child Left Behind Act of 2001 (PL 107–110) mandated that each state and local district be held accountable for the academic achievement of every student. Increased accountability has left many looking for efficient methods of increasing student

achievement. Researchers have spent considerable time and energy trying to identify the components of efficient learning.

The search has led to a dramatic change in pedagogy and direct student intervention over the last thirty years. The construct of self-regulation has emerged as a central theme in the study of academic learning. Self-regulation can be defined as self-generated thoughts, feelings, and actions for attaining academic goals (Zimmerman, 2002). Pintrich and Zusho (2002) extend this definition highlighting that self-regulated learners regulate and control their cognition, motivation, and behavior to obtain set goals guided and constrained by both personal characteristics and the contextual features in the environment. Educators' reliance on didactic instruction has given way to a focus on self-reflection and scaffolded activities, providing incremental mastery experiences (Paris & Paris, 2001).

This transition from the "blind training" of laboratory controlled studies of the 70s to the "informed" classroom-based activities of the 1980s and beyond illustrates a greater understanding of the need for a more cognitive and explicit pedagogy (Brown, 1978). Engaging students in reflective discourse (Paris & Paris, 2001) replaced the practice of telling students how to complete an activity. Self-regulation research has taken a variety of directions as illustrated by Paris and Paris (2001), including the phenomenological aspects of self-regulated learning (McCombs & Marszano, 1990), children's social regulation (Patrick, 1997) and family influences on self-regulation (Grolnick, Kuroski, & Gurland, 1999). In addition, the effect of self-regulated learning on student persistence and academic achievement has been an active area of research (Pintrich & DeGroot, 1990).

A variety of underlying processes such as metacognition, locus of control, self-efficacy, and goal orientation are pivotal precursors to one's ability to self-regulate learning. Researchers are in agreement that students who possess the ability to self-regulate their own learning differ in a variety of dramatic ways from those who lack the ability to self-regulate their learning. Self-regulated learners set goals, successfully manage motivation, and affect and apply strategies consistently and effectively (Winne, 1995).

Pintrich (2000c) utilizes a four phase model as a heuristic that incorporates the processes common among models of self-regulation. Phase One involves planning and goal setting as well as the assessment of one's prior knowledge in relation to the task at hand. Phase Two focuses on various monitoring processes that represent metacognitive awareness. Phase Three involves control/regulation of different aspects of one's self and the task in context. Phase Four represents one's reactions or reflections of the process. Pintrich (2000c) states that the awareness and control/regulation processes involved in stages Two and Three are key developmental outcomes during the course of schooling. Much of the information incorporated within Pintrich's (2000c) heuristic is an extension of the early research conducted by Pintrich and DeGroot (1990). Their research illustrated the important interaction of self-efficacy beliefs on the use of metacognitive strategies, both knowledge and regulation of cognition, when attempting to understand and promote self-regulated learning in children (Pintrich & DeGroot, 1990).

There are many underlying constructs involved in the development of self-regulated learning. The current research study will investigate the relationship between self-efficacy, a component of Social Cognitive Theory, and regulation of cognition, a

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component of metacognition, two central constructs embedded in the development of self-regulated learning.

Metacognition

The study of metacognition began with the work of Flavell (1979). In his initial model, Flavell (1979) discussed cognitive monitoring or metacognition as interplay between four underlying processes. First, metacognitive knowledge is defined as knowledge or beliefs that contribute to the product of a cognitive activity. Flavell (1979) delineates metacognitive knowledge to person, task, and strategy variables. Second, metacognitive experiences are reactions to an individual's own metacognitive processes and can be affective, self-monitoring, or evaluative, and can guide strategy selection and use (Flavell, 1979). Third, an individuals understanding that some tasks or activities require more cognitive resources than others (Flavell, 1979). Knowledge that strategies, the fourth component, vary in their quality and application and that some strategies are superior to others (Flavell, 1979). Flavell (1979) states, "Cognitive strategies are invoked to make cognitive progress, metacognitive strategies to monitor it" (p. 909).

Twenty years later, Vaidya (1999) supported Flavell's thinking by delineating the difference between cognitive and metacognitive processes. Cognitive strategies are typically task specific in their application, skills that assist students in completing a task (Schreiber, 2005). A metacognitive process is executive or self-regulatory in nature. Metacognitive strategies such as planning, monitoring, and evaluating are process related activities and not anchored to any specific task (Vaidya, 1999). Metacognitive processes serve to "facilitate understanding and regulation of performance" (Schreiber, 2005, p. 217).

Regulation of cognition, a central construct under investigation in the present study, is defined as "metacognitive activities that help control one's thinking or learning" (p. 354) such as planning, evaluation, and self-monitoring (Shraw & Moshman, 1995). Developmental changes occur in students' ability to regulate their cognition. As students mature, they gain more content knowledge and become more capable of applying metacognitive strategies (Rafoth, 1999; Rafoth, Leal & Defabo, 1993) in part, due to the increased capacity of working memory (Baker, 2005). The link between increased levels of academic achievement and the ability to regulate cognition has been supported in the research (Butler & Winnie, 1995). Forrest-Pressley, Waller, and Pressley (1989) found metacognitive interventions that focused specifically on reading had a significant impact on reading achievement with reported effect sizes ranging from 0.28 to 0.41. While the relationship between regulation of cognition and the control variables of student sex and socioeconomic status is not well defined in the research literature, research does support a positive relationship between socioeconomic status and student achievement (Sirin, 2005).

Self-Efficacy

The link between regulation of cognition and self-efficacy is viewed diversely within the literature. McCombs and Marzano (1990) describe the relationship between self-efficacy, metacognition, and self-regulation, and stress the importance of self as agent. "Awareness or a realization of self as agent, via the process of metacognition, produces self-efficacy and results in internalized goals for learning" (p.52). Self-efficacy defined as an individual's belief in one's ability to acquire new information or complete a task or activity to a prescribed level of performance (Bandura, 1986) is a major construct within social cognitive theory and a primary focus of the current study.

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Social cognitive theory posits that achievement is dependent on the interaction of personal thoughts and beliefs, behavior, and the conditions present in the environment (Bandura, 1986, 1997). In order to regulate cognition and learning effectively, students must develop a sense of self-efficacy. Self-efficacy is hypothesized to affect individual choice regarding activities, effort, persistence, and achievement (Schunk, 1996). Highly efficacious students read more (Wigfield & Guthrie, 1997) with greater comprehension (Anderson, Wilson & Fielding, 1988).

The development of self-efficacy begins in the student's family environment and progresses with age, due partly to exposure to models and the sense of progress that comes from mastery experiences (Bandura, 1986). The family variable of socioeconomic status is positively related to academic achievement (Sirin, 2005). The relationship between self-efficacy and socioeconomic status has not been demonstrated. Sex related differences are unclear. While gender differences are reported with frequency during middle school and beyond, these differences may be due to measurement issues (Parjares, 2002).

<div align="center">Academic Achievement</div>

Pintrich and DeGroot (1990) provided empirical support that student who believed in their own ability displayed greater levels of cognitive engagement, strategy use, and self-monitoring of performance. Students displayed the ability to regulate their affect in order to persevere in the face of more difficult and less interesting tasks.

While knowledge of metacognitive strategies is important, Pintrich and DeGroot (1990) found it insufficient in promoting student achievement. Motivated student behavior or the willingness to change behavior is an essential variable (Pintrich & DeGroot, 1990). Metacognitive awareness is not the only requirement for self-regulated

learning. Zimmerman acknowledges the need for a sense of "personal agency to regulate other sources of personal influence, such as the emotional processes, as well as behavioral and social-environmental sources of influence" (p. 218).

Duckworth and Seligman (2005) questioned the relationship between intellectual ability and academic achievement. While it is commonly believed that student achievement is primarily a facet of ability, the authors sought to explain the tremendous variance in achievement among individuals with similar intelligence quotients (IQ). Self-discipline was measured by use of self, parent, and teacher reports, and both a behavioral and hypothetical delay of gratification measure were obtained for each student. Group intelligence quotient scores were obtained as a measure of cognitive ability. Results indicate that self-discipline measured in the fall predicted more variance on each academic performance variable (e.g., report card grades, standardized achievement test scores, admission to competitive academic placements, and attendance) than did IQ. Duckworth and Seligman (2005) provide contemporary support establishing the need to look beyond ability when investigating children's academic achievement, reaffirming the findings of Pintrich and DeGroot (1990) and Swanson (1990).

Valentine, DuBois, and Cooper (2004) illustrate the lack of research on the impact of reading self-efficacy on reading achievement in their meta-analysis of 55 research reports ranging from published journal articles and dissertations to conference reports, chapters, and complete books. The meta-analysis included reviews of 60 independent samples and contained 282 separate effect sizes. None of the studies included in the meta-analysis investigated reading self-efficacy specifically, and only two studies focused on reading self-concept (Valentine, DuBois, & Cooper, 2004). While the relationship between metacognition and reading achievement has been an area of study

(Bouffard & Vezeau, 1998; Chiu, 1998; Haller, Child & Walberg, 1988), the current review of research failed to identify research investigating the relationship between regulation of cognition and reading self-efficacy on the reading achievement of an intermediate elementary sample.

Definition of Terms

In order to promote a common conceptual understanding, the following list provides an operational definition for terms used throughout this research project.

Self-Regulation is defined as self-generated thoughts, feelings, and actions for attaining academic goals (Zimmerman, 2002). This is accomplished through the regulation and control of cognition, motivation, and behavior. Self-regulation is guided and constrained by both personal characteristics and the contextual features in the environment (Pintrich & Zusho, 2002).

Self-Efficacy is defined as a person's belief in their ability to acquire new information or complete a task or activity to a prescribed level of performance (Bandura, 1986).

Self-Concept is defined as a person's general perception of competence for a given domain (e.g., sports or academics) (Linnenbrink & Pintrich, 2003).

Perceived Competence is defined as the general sense of capacity to perform in a given area (e.g., academic, social, physical) (Harter, 1982). While self-concept, self-efficacy and perceptions of competence appear as similar constructs, there are significant conceptual differences (Bong, 1996). Self-efficacy judgments are task and situation specific compared to the domain level assessment frequently utilized in self-concept and perception of competence research.

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Flavell (1979) discussed cognitive monitoring or metacognition as interplay between metacognitive knowledge, metacognitive experiences, goals and strategies.

Regulation of Cognition is defined as "metacognitive activities that help control one's thinking or learning" (p. 354) such as planning, evaluation and self-monitoring (Shraw & Moshman, 1995). Regulation of cognition is similar to Flavell's (1979) description of metacognitive experiences.

Knowledge of Cognition is defined as an individual's knowledge about their cognitive resources including declarative, procedural and conditional knowledge (Shraw & Dennison, 1994).

Executive Function is generally thought of as an umbrella construct that describes an individual's ability to behave in a goal directed way (Gioia, Isquith, Guy, & Kenworthy, 2000). More specifically, executive function is defined as the ability to develop goals, hold them in active memory, examine ongoing performance, and adjust performance as needed to attain the stated goal (Anderson, 2001).

Self-Discipline was described by Duckworth and Seligman (2005) as a nonintellectual strength defined as a composite measure of self-control, impulsiveness, and the ability to delay gratification.

Statement of the Problem

The current study will focus on the relationship of metacognition and self-efficacy on reading achievement by answering the following research questions. Figure 1 provides a visual representation of the current study.

1. What is the relationship between student age and the dependent variables of regulation of cognition, as measured by *The Behavior Rating Inventory of Executive Function* (BRIEF) (Gioia, Isquith, & Kenworthy, 2000). and reading

self-efficacy, as measured by *The Reader Self-Perception Scale* (RSPS) (Henk & Melnick, 1995) and reading achievement, as measured by oral reading fluency data? The researcher's hypothesis is to reject the null hypothesis for reading achievement and regulation of cognition. It is hypothesized that older students will display higher levels of both regulation of cognition and reading achievement (Baker, 2005; Rafoth, 1999; Rafoth, Leal & Defabo, 1993). It is anticipated that no predictive relationship will exist between reading self-efficacy and age (Bouffard & Vezeau, 1998).

2. What is the relationship between student sex and the dependent variables of regulation of cognition, reading self-efficacy and reading achievement? The researcher's hypothesis is to accept the null hypothesis for reading achievement, regulation of cognition and reading self-efficacy. Parjares (2002) reports insignificant sex related differences in ratings of self-efficacy in elementary age children. However, there is a need for additional research in this area to confirm previous findings. Due to the lack of research, additional information is needed to clarify the relationship of sex to regulation of cognition and reading achievement.

3. What is the relationship between family socioeconomic status, as measured by household income and level of maternal/paternal education, and the dependent variables of regulation of cognition, reading self-efficacy and reading achievement? The researcher's hypothesis is to reject the null hypothesis for reading achievement. It is hypothesized that a positive relationship between family socioeconomic status and reading achievement exists, as higher parental education and socioeconomic status is linked to increased levels of achievement (Sirin, 2005). The researcher's hypothesis is to accept null hypothesis

forregulation of cognition and reading self-efficacy due to the lack of research

investigating this relationship in an intermediate elementary sample.

4.   What is the relationship of reading self-efficacy on reading achievement? The

researcher's hypothesis is to reject the null hypothesis. Higher levels of self-

efficacy contribute to gains in academic achievement. It is hypothesized that a

positive predictive relationship exists between reading self-efficacy and reading

achievement (Wigfield & Guthrie, 1988; Multon, Brown and Lent, 1991).

5.   What is the relationship of reading self-efficacy on regulation of cognition? The

researcher's hypothesis is to reject the null hypothesis as more efficacious

students exhibit better regulation of cognition. It is hypothesized that a positive

predictive relationship exists between reading self-efficacy and regulation of

cognition (Bandura, 1989; Pajares & Schunk, 2001; Pintrich & Zusho, 2002).

6.   What is the predictive relationship of age, student sex, socioeconomic status,

reading self-efficacy, and regulation of cognition on reading achievement? The

researcher's hypothesis is to reject the null hypothesis. While the strength and

significance of each block of variables on reading achievement is unknown, the

predictor variables of age, sex, socioeconomic status, reading self-efficacy, and

regulation of cognition are associated with reading achievement and will increase

the explained variance of reading achievement.

<div align="center">Limitations</div>

The current research is limited by the population sample available. Due to the lack

of racial/ethnic diversity within the Muncy School District, no generalizations of the

impact of metacognition and reading self-efficacy on reading achievement can be

presented. The sample was also one of convenience; inclusion in the study was possible

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due to the researcher's professional association with the district. While the static group comparison design provides practical strengths, it lacks the strength inherent in a true experimental design.

Concern over the reading achievement of today's students has reached the level of national attention as to be considered a public health concern by the National Institute of Child Health and Human Development (Sweet, 2004). Educational research in the areas of metacognition, self-efficacy and self-regulated learning spanning the last thirty years has provided a rich and productive line of research in support of improving education. It is the hope of this author that the current research study can add to the current fund of knowledge and in some small way increase our understanding of learning.

<div style="text-align:center">Summary</div>

In a time of tremendous technological and economic change, the ability to read well has never been so important. The adults of tomorrow will need the skills to manage their own learning throughout their lifetime. While metacognition and self-efficacy have been productive areas of research, the theoretical linkages between these constructs to the broader area of self-regulated learning have yet to be fully explored.

CHAPTER 2

LITERATURE REVIEW

The following review will highlight the importance of students' ability to self-regulate learning to achievement, particularly in reading. Included in the discussion will be a review of the underlying constructs of interest for the current study, specifically regulation of cognition, self-efficacy, and reading achievement. The relationship of the control variables of age, sex, and socioeconomic status will also be reviewed.

Educators realize that the era of simply imparting basic factual knowledge to their students has passed. What is required now is the pedagogical knowledge and skill to facilitate the creation of lifelong learners. Zimmerman (2002), a prolific researcher in the area of self-regulated learning, states that self-regulation is important because a major function of education is the development of lifelong learning skills. Multiple research studies agree that there are many benefits inherent to being a self-regulated learner (Grolnick Kuroski & Gurland, 1999; McCombs & Marzano, 1990; Patrick, 1997; Pintrich, 2000c; Pintrich & DeGroot, 1990; Winne, 1995).

> Self-regulation is not a mental ability or an academic performance
> skill; rather it is the self-directive process by which learners
> transform their mental abilities into academic skills. Learning is
> viewed as an activity that students do for themselves in a proactive
> rather than as a covert event that happens to them in reaction to
> teaching (Zimmerman, 2002, p. 65).

The literature supports the premise that self-regulatory processes are teachable and can lead to improvements in both student motivation and academic achievement (Schunk & Zimmerman, 1997). This constructivist view of self-regulation acknowledges

that the capacity to control or regulate cognition, motivation, affect, and behavior is an important developmental task. Students become more strategic and more capable of applying both cognitive and metacognitive strategies with age (Pintrich & Zusho, 2002; Rafoth, 1999; Rafoth, Leal & Defabo, 1993). This developmental trend is due in part to greater working memory capacity (Baker, 2005; Brocki & Bolin, 2004). While development provides for increases in working memory capacity, it also allows for the acquisition of more domain specific content knowledge. Investigations of novices and experts revealed significant benefits afforded those with significant breadth of domain-specific knowledge. Having an existing knowledge base reduces the drag on cognitive resources such as attention and effort because the more efficient retrieval of information provides cognitive resources for planning and general self-monitoring activities (Pintrich & Zusho, 2002).

Schunk and Zimmerman (1994; 1998) provide a dissection of subcomponent skills and abilities basic to self-regulation. They posit that self-regulation is not an all or nothing ability but a selective use of specific actions or processes that must be adapted to a particular task.

> The component skills include the following: setting specific
> proximal goals for oneself; adopting powerful strategies for
> attaining goals; monitoring one's performance selectively for signs
> of progress; restructuring one's physical and social context to
> make it compatible with one's goals; managing one's time use
> effectively; self-awareness; and attributing causes to results and
> adapting future methods (p. 66).

As can be seen in this review of the subcomponents of self-regulation, there are many underlying constructs involved in the development of self-regulated learning. The current research study will investigate the relationship between self-efficacy, a component of social cognitive theory, and regulation of cognition, a component of metacognition, two central constructs embedded in the development of self-regulated learning. The study of metacognition began with the work of Flavell (1979).

Importance of Metacognition

Flavell (1979) proposed the importance of metacognition in areas of oral communication, oral persuasion, reading comprehension, writing, attention, memory, problem solving, social cognition, and various types of self-control and self-instruction. The factors of person, task, and strategy were discussed in Flavell's research. Person variables include the entirety of one's beliefs about the world. Task variables concern one's assessment of the task itself, whether it required little or great effort or the need for additional resources. Strategy factors include an understanding of methods or underlying strategies that support successful task completion (Flavell, 1979). Flavell (1979) also discussed an affective component referred to as metacognitive experiences. Metacognitive experiences include feelings that drive strategy use (Sperling, Howard, Miller, & Murphy, 2002). Jacob and Paris (1987) contrast Flavell's affective, and at times subconscious, metacognitive experiences with Brown's (1978) intentional and unemotional conceptualization of executive processes.

Brown's (1978) view of metacognition recognized two fundamental aspects of metacognition which includes knowledge of cognition and regulation of cognition. Knowledge of cognition includes three subprocesses that support the reflective aspect of metacognition: declarative knowledge or knowledge about self and about strategies;

procedural knowledge or knowledge about how to use strategies; and conditional

knowledge or knowledge about when and why to use strategies (Schraw & Dennison,

1994). Regulation of cognition, an emphasis in Brown's research, focused on executive

strategies such as planning, monitoring, revising and repairing comprehension (Jacobs &

Paris, 1987).

<center>Regulation of Cognition</center>

An exceptional overview of the process of integrating metacognitive knowledge

and self-regulatory skills into individual metacognitive theories is provided by Schraw

and Moshman (1995). Their current research continues to support the premise of Brown

(1987) and Baker (1991) that metacognition is composed of two distinct components,

knowledge of cognition and regulation of cognition. Regulation of cognition is defined as

"metacognitive activities that help control one's thinking or learning"(Schraw &

Moshman, 1995, p. 354). The findings of multiple research studies support the premise

that students who are more effective in regulating their use of cognitive strategies show

greater adaptive performance and achievement (Butler & Winne, 1995). While the

component skills of planning, information management strategies, comprehension

monitoring, debugging strategies, and evaluation have been discussed extensively in

connection with the control aspect of learning (Schraw & Dennison, 1994), Schraw and

Moshman confirm Jacobs' and Paris' (1987) earlier belief that three components are

generally included in all definitions of regulation of cognition. The first component is

planning, which refers to the selected coordination of cognitive resources to a goal

(Jacobs & Paris, 1987). The cognitive ability to plan, including the metacognitive

awareness of planning as a process, is developmental with significant growth occurring in

the upper elementary through middle school years (Garner & Alexander 1989). In

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research on writing, Bereiter and Scardamalia (1987) found that older, more experienced writers were able to plan in a more global fashion and were less dependent on text content. Novices differed significantly from their more experienced counterparts in a variety of ways. Novices typically were more reactive and demonstrated less planning. Novices also failed to set specific goals (Zimmerman, 2002). There is empirical support that goal setting, especially specific, difficult goals lead to improvements in performance (Locke & Latham 2002). Wolters (1998) proposes that the definition of regulation of cognition has been too narrowly defined to include only the extent to which students self-monitored and controlled study strategies. Students' ability to manipulate their environments in order to manage their own motivation is theoretically consistent with regulation of cognition (Boekaerts, 1997; Wolters, 2003). To investigate regulation of cognition in a college age sample, Wolters (1998) investigated strategies utilized by students when motivation or interest was lagging. Overall, results indicated that some students used a variety of strategies such as environmental manipulation, willpower, attention strategies and cognitive strategies to support effort and persistence for academic tasks. Cognitive strategies were the most frequently used, with 22% of the 150 college students sampled reporting use of a cognitive strategy when faced with the task described as difficult, uninteresting, or one that lacked value. Results of the study indicated that students who utilize cognitive strategies to actively control their cognitive engagement used more metacognitive strategies and displayed increased academic achievement (Wolters, 1998; Zimmerman & Martinez-Pons, 1990).

The second dimension of regulation of cognition is the ongoing process of evaluation (Jacobs & Paris, 1987; Schraw & Moshman, 1995). Evaluation is defined as the appraisal of one's self-regulatory process and related outcome. Studies of good and

poor writers found those skilled in evaluation more capable of transforming knowledge in their writing versus the telling knowledge approach utilized by less skilled writers (Bereiter & Scardamalia, 1987).

The third component, self-monitoring, allows an individual to monitor progress. Self-monitoring allows the learner to adjust to changing task demands as well as to successes and failure while engaged in the actual task (Jacobs & Paris, 1987; Schraw & Moshman, 1995).

While domain and strategy specific knowledge is important, the current study will focus on the regulation of cognition and its impact on student achievement specifically in the area of reading. While many students have content knowledge and knowledge of cognition, or an understanding of their own cognitive strengths and weaknesses, Schraw (1994) found that many failed to regulate their cognition in support of achievement.

Knowledge of Cognition

Knowledge of cognition, the second component of metacognition, is typically defined as what individuals know about their own cognitive resources. Cognition refers to the process of coming to know and understand and is generally associated with the question of what (Shraw & Moshman, 1995). Flavell (1970) used the term metamemory when referring to an individual's understanding of memory and the term can be broken down into person, task, and strategy factors. Person factors take into account what is known of our own memory capacity. Task factors tailor an individual's approach to an activity to match the current activity. The Strategy factor or our understanding that success on any given activity can vary based on how it is approached (Flavell, 1970, 1979). Jacobs and Paris (1987) included in their definition on ". . . knowledge about cognition can be demonstrated, communicated, examined, and discussed . . . the essential

defining feature is that metacognition can be made public. Thus, it is reportable, conscious awareness about cognitive aspects of thinking" (p. 258). Knowledge of cognition is broken down into three component processes: "declarative knowledge or knowledge of self and about strategies, procedural knowledge or knowledge about how to use strategies, and conditional knowledge or knowledge about when and why to use strategies" (Schraw & Dennison, 1994, p. 460).

Brown and Smiley (1978) noted that some students spontaneously underlined or paraphrased important texts without specific instruction. Other groups, when instructed, complied with direction from the researchers; however, they failed to focus on the critical aspects within the text (Brown & Smiley, 1978). This highlights the distinction between utilization of one's knowledge of cognition or passive strategy use based on instruction versus the evaluative aspects of one's ability to regulate cognition, or an active self-monitoring of the success of the strategy in achieving the stated goal (Brown & Smiley, 1978).

Paris and Paris (2001) delineated four basic steps in applying strategy research into the classroom setting. First, the "why" was added to the "how" of strategy instruction. Students were told explicitly, on a cognitive level, which strategies worked and why they worked. Explicit instruction on declarative, procedural, and conditional knowledge that underlies effective strategy learning was considered essential to effective strategy instruction. Second, the teaching of learning strategies became fun and functional with acknowledgment of the relationship of motivation and emotion to learning and teaching. Third, strategy instruction moved from global to differentiated and domain specific. Fourth, strategy instruction has increased emphasis on training that fosters discourse and self-reflection (Paris & Paris, 2001). Researchers (Bandura, 1986,

1997; Parjares, 1996) acknowledge the need to incorporate an affective variable, such as self-efficacy, as espoused by McCombs and Marszano (1990).

<p align="center">Self- Efficacy Theory</p>

The construct of self-efficacy has its impetus in social cognitive theory (Bandura, 1986, 1997). Bandura differentiated his social learning theory from other learning theories by including cognitive within its title (Perjares, 2002). The purpose was to highlight the "central role of cognitive, vicarious, self-regulatory, and other self reflective processes in human adaptation and change" (Pajares, 2002, p. 1). A basic premise of social cognitive theory frames behavior including academic achievement within an interactive context of behavior, personal thoughts and beliefs, and conditions present in the environment (Schunk & Pajares, 2002). How individuals perceive their performance alters their self-beliefs through self-reflection, which in turn affects future performance. This interaction between individual and environment forms the basic concept of reciprocal determinism (Pajares, 1996). Reciprocal determinism is the feedback cycle created between a person's unique thoughts, feelings and genetic predispositions, behavior, and environmental events (Pajares, 2002). Self-reflection is presented as a distinctively human characteristic as self-reflective comparisons are the conduit of behavioral and cognitive change. This sense of personal agency or control makes therapeutic change possible due to the interactive nature of behavior and cognitive change.

Social cognitive theory differentiates itself from theories rooted in strictly behavioral and biological/evolutionary positions. The disregard of internal self-reflective activities is completely contrary to Bandura's (1986) steadfast belief that the tremendous complexity of human behavior cannot be fully understood without acknowledging the

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value of introspection. While humans are the result of their evolutionary history, Bandura disagrees with a strict evolutionary/biological interpretation of human behavior, espousing an interaction between the capabilities provided to humans through evolution and the evolutionary pressures created by human invention (e.g., symbolic language) (Pajares, 2002).

While individuals have the personal agency to behave in proactive ways via "what people think, believe, and feel affects how they behave" (Bandura, 1986, p. 25), they are still embedded within social systems. While these systems (e.g., economic, educational, familial) do not affect behavior directly, they do exert an indirect effect through impact on self-efficacy beliefs, emotional health, and aspirations for education (Pajares, 2002).

Social cognitive theory (Bandura, 1986) conceives the capacity for abstract thinking as a uniquely human condition characteristic. Incorporated into this ability to abstract is the ability to use symbols, learn without the need for direct experience, visualize and plan for the future, and self-reflect on actions. These are the cognitive building blocks of self-efficacy (Pajares, 2002). Cognitive, metacognitive and the motivational aspects of self-regulation are assimilated within the context of social cognitive theory.

Self-efficacy is the personal belief regarding one's ability to learn or perform at a skillful level and is based in the broader context of Bandura's social cognitive theory (1986). Self-efficacy beliefs have been tied to increased levels of task persistence (Wolters, 2003), academic achievement (Multon, Brown, & Lent, 1991), goal setting (Locke & Latham, 2002), educational and career aspirations (Bandura, Barbaranelli, Vaprara, & Pastorelli, 2001), and work related performance (Stajkovic & Luthans, 1998).

Initial sources of self-efficacy are reciprocal and family based. An enriched family environment with multiple embedded mastery experiences fosters self-efficacy beliefs. Parent interest is piqued by their children's excitement and curiosity in exploring their environment (Schunk & Pajares, 2002).

The degree of parent efficacy influences parenting style along with the degree and type of home-school involvement. Highly efficacious parents are involved in their children's schooling because they believe it makes a difference in their child's education. Parents with a high sense of efficacy displayed increased levels of classroom volunteering and more educational activities were included in the home environment (Hoover-Dempsey, Bassler, & Brissie, 1992).

The development of positive self-efficacy beliefs is necessary as research supports that an individual's self-efficacy beliefs affect academic performance independent of ability, differentiating students of similar ability (Swanson, 1990).

Stajkovic and Luthans (1998) provide a meta-analysis examining the relationship of self-efficacy and work related performance. One hundred and fourteen studies averaging 157 participants with a total sample in excess of 21,000 were utilized for this meta-analysis. Results indicated a .38 correlation between self-efficacy and positive work-related outcomes or a 28% gain in performance when viewed in terms of effect size estimates (Stajkovic & Luthans, 1998).

While there are many constructs related to self-perception within the literature on self-regulated learning (e.g., self-concept, locus-of-control, attribution theory), the current research study is primarily focused on the broad construct of self-efficacy with a domain specific focus on reading. While the general literature review of self-efficacy and

metacognition is established, a review of self-efficacy beliefs and metacognitive awareness from a developmental perspective is required.

<center>Developmental Trends</center>

Metacognition

The ability to self-regulate learning and behavior is developmental. Nicholls (1978) investigated the development of children's perceptions of ability and effort within the context of achievement motivation. Results of Nicholls' research supported a four level developmental hierarchy. In the first level, approximately ages five and six, the impact of effort and ability on a specific outcome cannot be distinguished by the child. In the next level, approximately ages seven through nine, effort and ability are distinguishable; however, effort is seen as the necessary component of successful task completion. At level three, approximately ages nine and ten, children began to see ability as a cause of achievement but not of equal importance as effort. Developmentally, the understanding of capacity or ability as a limitation not correctable through effort becomes a reality in level four, approximately ages ten through thirteen. Stipek and MacIver (1989) confirm Nicholls'findings as young children often believe effort and teacher praise are synonymous with high achievement. As external comparisons via teacher feedback through grades or by observing peers become more frequent, perceptions of ability in reading and math are formulated and become stable self-perceptions by upper elementary school (Bouffard & Vezeau, 1998; Stipek & MacIver, 1989). Stipek and Gralinski (1996) report a similar trend in their study of third through six grader's beliefs about intelligence and effort on academic performance. They found a significant change in students' understanding of ability and effort between the third and fourth grade. Stipek and Gralinski posit that third graders have more difficulty distinguishing between effort

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and ability. This finding is consistent with Nicholls (1978). During third and fourth grade, students construct theories of schooling that influence the quality of their participation in learning. Misperceptions can lead to passive engagement in learning (e.g., learned helplessness) throughout their academic careers (Paris & Newman, 1990). Specific to metacognition, Flavell (1979) understood that children were quite limited in their general fund of knowledge and their ability to self-monitor cognitive processes. Additional developmental research indicates primary age children (i.e., 7 and 8 year olds) rarely reflect on performance or control cognitive abilities when compared to intermediate age children (i.e., 11 and 12 year olds) (Paris & Newman, 1990). Several developmental causes for these age related changes have been offered in various fields of study. First, older students know more; they have greater domain knowledge and a greater familiarity with the trappings of school as well as with themselves as learners. There is also tremendous growth in a variety of processing capacities (e.g., language, attention, and memory). The growth in working memory capacity has been shown to be an instrumental component in children's ability to actively regulate their cognition (Baker, 2005). Brocki and Bolin (2004) report significant growth in working memory capacity in upper elementary school students. This growth mirrors the reasoning improvements noted by Nichols (1978) and Stipek and MacIver (1989). In fact, working memory capacity is strongly linked to high levels of academic achievement in individuals with typical to above average levels of working memory and to learning disabilities when a deficit in working memory capacity is present (Gioia, Isquith, Kenworthy & Barton, 2002). Pintrich and Zusho (2002) provide the following insight:

It is often suggested that for younger children or novices to

become more knowledgeable or skilled, they need to become more

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metacognitive and regulate their own learning. However, these

students are the ones who may have the most difficulty in enacting

the various regulatory strategies as use of these strategies will

involve working memory at the same time their lack of knowledge

also consumes working memory resources. Given this problem, it

is not surprising that novices often have to be "other regulated"

initially through coaching, structural supports, and teacher

scaffolding before they can be self-regulating (p. 258).

Social experiences within a child's family have a significant impact on the

development of metacognition. Families providing supported interactive problem solving

(e.g., planning, goal setting and task monitoring) at early ages, then gradually faded,

supports the development of metacognitive behavior (Baker, 2005). There are also

differences in the degree of importance parents place on self-reflective activities. Parents

who foster self-reflection by discussing thinking provide an avenue of social interaction

and modeling that enhances the development of metacognitive thinking (Borkowski,

Chan, & Muthukrishna, 2000). While socioeconomic status has been shown to be a

strong predictor of academic achievement (Sirin, 2005), Serpell, Baker and Sonnenschein

(2005) found when socioeconomic status is controlled, parent behavior (e.g., reading in

the home) was a significant predictor of metacognition.

Several studies employing a longitudinal design provide insight into the

development and stability of metacognition. In a follow-up to an earlier study (Van

Kraayenoord & Schneider, 1999) in which the relationships of reading, motivation and

metacognition of third and fourth graders were examined; Roeschl-Heils, Schneider, and

van Kraayenoord (2003) re-examined these variables utilizing 42% of their initial sample

during their seventh and eighth grade school years. Research results supported stability in measures of metacognitive strategies and reading self-concept. Regression analysis indicated that metacognitive strategy knowledge and reading self-concept accounted for about 31% of the variance in reading achievement.

Peverly, Brobst, and Morris (2002) looked at the impact of metacognitive control on studying in seventh and eleventh grade students. The success of studying was measured by the students' ability to recall information. This developmental approach indicated that grade and metacognitive regulation of monitoring accounted for 20% of the variance related to text recall.

Self-Efficacy

Bandura (1997) posits that four major sources of information are primary in the development of self-efficacy beliefs. First, mastery experiences are the most important and meaningful source of information. The successful completion of a task raises efficacy beliefs while failures lower them. Once efficacy is established and generally positive, occasional failures have minimal effect and are generally reframed as the result of some situational factor (e.g., fatigue or lack of effort). Early family and school influences have great effect on the development of mastery experiences. Parents who construct a home environment in which the child experiences similarities to school (e.g., reading, thinking, language) prime their children to embrace the challenges presented upon their entry into public education (Hoover-Dempsy, Bassler, & Brisse, 1992). Teachers nurture the development of self-efficacy by providing a variety of scaffolded experiences, designing instruction so that students sense incremental mastery of tasks (Pintrich & Zusho, 2002)

Second, vicarious experience is a powerful means of efficacy related information; especially if the model is similar to the observer (Bandura, 1997). Modeling is a powerful

way of imparting new skills and behaviors (Schunk, 2003). An individual's level of

attention to a model depends on a variety of factors, such as the perceived similarity

between the observer and the model and the functional value of the behavior. The

observed response of others to the behavior, whether it is rewarded or punished, has a

significant impact on the likelihood of the behavior being exhibited by the observer.

Reinforced behaviors are more likely to be copied than behaviors that are punished

(Schunk, 2003).

Third, social or verbal persuasion can impact self-efficacy beliefs if within

reasonable bounds. Persuasively overstating another's abilities can have negative

consequences if a failure experience results. It is easier to undermine efficacy than to

enhance it; especially if one has little experience with the topic/activity (Bandura, 1997).

Early in development, parents and teachers lavish praise and positive feedback on

children for participation and effort, often over the quality of their work. This trend

changes as parent and teacher comments become both more skill focused and more

critical and directive. Developmental changes in children's understanding of ability also

come into play as capacity limits (e.g., ability) becomes more apparent (Nicholls, 1978;

Stipek & MacIver, 1989). The fourth area of information is physiological states. People

use their internal feelings of anxiety, stress or fear generated when confronted with a task

as in indication of their confidence in completing the task. Individuals also utilize this

physiological feedback in planning their approach to a task.

Academic related anxieties can produce a dramatically negative effect (Bandura,

1997). As children progress and mature throughout their educational careers, they create

theories of schooling that may have profound impact on the course of their education. For

example, when a student believes that effort is important in achievement, the outcome is

positive and failure will be blamed on a lack either personal effort or on the actions of others. This outcome is quite positive as it promotes increased effort and avoids internal (i.e., ability) attributions for failure. Although a child's personal theory may be distorted and not a true reflection of reality, it still has great impact educationally. In other circumstances, a student may form a theory that rejects the efficacy of effort due to a belief in low ability and resign his duty to be actively engaged in his education (Bandura, 1989; Cain & Dweck, 1995; Paris & Newman, 1990). While future events can't guide behavior, the idea of future events is transformed into motivating beliefs by use of an anticipatory cognitive simulation. During these simulations, individuals with high levels of self-efficacy visualize success scenarios that guide present behavior. Those with inefficaous beliefs visualize poor outcomes.

Locke and Latham (2002) provide a synthesis of goal setting theory and report a close association to self-efficacy beliefs. Highly efficacious people set higher goals for themselves and are more committed to fulfilling their goals. Goals impact on performance in a variety of ways. First, goals provide direction and help focus both cognitive and behavioral activities. Second, goals enhance activity levels with higher-level goals activating more effort than lower level goals. Third, goal setting is related to task persistence as hard goals increase effort. Locke and Latham state "there is often, however, a trade-off in work between time and intensity of effort. Faced with a difficult goal, it is possible to work faster and more intensely for a short period or to work more slowly and less intensely for long period. Tight deadlines lead to a more rapid work pace than loose deadlines" (p. 707). Fourth, goals heighten activity levels as individuals implement strategies or search to discover the appropriate task related strategy. Locke and Latham state "people with high self-efficacy are more likely than those with low self

efficacy to develop effective task strategies. There may be a time lag between assignment of the goal and the effects of the goal on performance, as people search for appropriate strategies" (p. 707).

<div align="center">Reading Achievement</div>

Metacognition

Self-regulatory behavior has been shown to be an important component of students' level of academic achievement independent of ability defined by intelligence quotient scores. Swanson (1990) investigated the relationship between high and low metacognitive knowledge and high and low ability level on a problem-solving task. While the high ability and high metacognitive knowledge group outperformed all others, students with low ability and high metacognitive knowledge consistently outperformed low metacognitive groups independent of their level of ability(Swanson, 1990).

Self-regulated learners utilize metacognitive strategies especially at times of high cognitive demand such as during the initial learning stages or while troubleshooting a particular task (Paris & Paris, 2001).

There is support for the positive impact of metacognition on student learning. Haller, Child and Walberg (1988) reported a mean effect size of 0.71 in their review of twenty studies investigating the impact of teaching metacognitive skills on reading comprehension. While there are varying definitions of metacognition as related to reading, Haller, Child, and Walberg find general agreement that metacognition consists of "awareness, monitoring and regulating functions to aid faltering understanding (p. 6)." Studies included in the meta-analysis were coded into a category of regulation of cognition. Self-questioning and text awareness were found to be the most successful strategies (Haller, Child, & Walberg, 1988).

Bouffard and Vezeau (1998) completed a longitudinal investigation of children's beliefs about themselves as cognitive agents, able to exercise control to achieve success and beliefs about their ability as readers utilizing 178 elementary school children in grades four through six (p. 254). Reading achievement, the dependent variable, was measured by standardized achievement test. While there were age related changes on measures of metacognition, with students becoming more mature metacognitively with age, measures of ability and self-efficacy remained consistent across grade levels (Bouffard & Vezeau, 1998). The stability of ability scores throughout grades four through six is contrary to Stipek and MacIver's (1989) earlier findings of decreased perceptions of competence with age. The authors posit the longitudinal design, versus the cross sectional design utilized in study by Stipek and MacIver (1989) may be responsible for this contrary finding. Boys' and girls' beliefs about themselves as cognitive agents remained stable across the three-year study. Ability scores for males increased while remaining stable for females. Females' self-perceptions of reading ability declined from grade four through grade six.

Bouffard and Vezeau (1998) separate various self-regulatory behaviors for the purpose of analysis: appropriate self-regulatory behaviors, inappropriate self-regulatory behaviors, and covert self-regulation. The category of appropriate self-regulatory behaviors includes such things as "moving backward and forward through text, reviewing the entire text or previous sentence, using a dictionary and the grammar book, and verifying work time remaining" (pp. 258-259). Inappropriate self-regulatory behaviors focused on maladaptive behaviors and covert self-regulation referred to the subject's ability to determine correct from incorrect responses. Behaviors identified as appropriate and covert self-regulatory behaviors are consistent with the construct a regulation of

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cognition. The results of path analysis report that regulation of cognition accounted for 16% of the variance of reading achievement in grade four; 25% of the variance of reading achievement in grade five; and 36% of the variance of reading achievement in grade six (Bouffard & Vezeau, 1998, pp. 260–262).

In his study of regulation of motivation/cognition in a college-age sample, Wolters (1998) reports that metacognition explained a significant amount of the variance of achievement, measured by course grade, with an effect size of 0.26. Wolters (1999) extended his work investigating the impact of student use of motivational/cognitive regulation strategies to their use of metacognitive strategies, effort and performance. Results supported a significant effect size with regulation of cognition/motivation accounting for 22% to 32% of the variance of learning strategy use. The same regulatory variables account for 22% of the variance for effort and 16% of the variance of student grade (Wolters, 1999).

Chiu (1998) conducted a meta-analysis of 43 studies targeting metacognitive training programs in reading completed in the ten years since the synthesis of research completed by Haller, Child, and Walberg (1988). A main focus of Chiu's research was to establish components of effective metacognitive training programs. A total of 3,475 students participated in the 43 studies, with an average sample size of 81. Chiu's analysis of 123 effect sizes yields an average effect size of 0.67. Effect sizes were 0.52 standard deviations larger when a non-standardized measure of achievement was used as a measure of reading achievement. There was also a significant positive relationship when instruction was delivered in a small group format to students at or above fifth grade. A limitation of the current meta-analysis was that motivational and affective constructs

were not considered. The following review illustrates the significant positive impact of self-efficacy beliefs across a variety of areas.

Self-Efficacy

Research on reading motivation indicates that children who feel competent and efficacious about reading are more likely to engage in reading (Wigfield & Guthrie, 1997). Anderson, Wilson and Fielding (1988) found that increased engagement in reading, measured as independent reading outside of school hours, accounted for 16% of the variance in the reading comprehension of fifth graders (as cited in Wigfield & Guthrie). However, Schunk and Pajares (2002) state "no amount of efficacy will produce competent performance when requisite skills and knowledge are lacking" (p. 16).

Multon, Brown, and Lent (1991) provide meta-analytic support for the hypothesis that self-efficacy beliefs facilitate improved academic performance (e.g., standardized achievement tests, classroom related materials and grades) and task persistence (e.g., time on task, items attempted/completed, number of academic terms completed). Moderate effect sizes were reported for both performance (0.38) and persistence (0.34). A number of factors moderated the size of the effect including time of assessment, age, and performance measure. Posttest assessment report a greater effect size (0.56) than pretest assessment (0.32) which provides support for the success of the intervention. Age trends indicated greater effect sizes for college students (0.41) than for high school (0.35) or elementary students (0.21). The measurement of basic skills as a performance measure generated greater effect sizes (0.52) than did classroom based performance measures such as grades (0.36).

Overall, correlations between self-efficacy and academic performance in which self-efficacy is task analyzed and closely corresponds to the critical task have ranged

from correlations of .49 to .70 with direct path coefficients of 0.349 to 0.545 (Pajares, 2002).

Pajares (2002) reports that gender differences are reported frequently in the academic self-efficacy literature. These differences include a greater tendency for girls to self-regulate learning during elementary school level. Pajares reports males and females report similar efficacy scores in mathematics until middle school when boys rate themselves as more efficacious. Although females tend to score better on objective measures of language arts, ratings are quite similar for boys and girls. However, because much of the gender differences disappear when variables such as prior achievement are controlled, gender differences may in fact be linked to measurement artifacts (Pajares, 1996).

Shell, Murphy and Bruning (1989) examined the relationship between self-efficacy, outcome expectations and achievement in reading and writing in an undergraduate sample. Results of a multiple regression analysis indicates approximately 32% of the variance of reading achievement was explained by measures of reading self-efficacy and outcome expectation beliefs. Shell, Murphy and Bruning provides support that a single generalized dimension exists linking self-efficacy beliefs to reading and writing performance. Zimmerman, Bandura, and Martinez-Pons (1992) demonstrated a significant effect size of 0.21 to academic achievement and 0.36 to improvements in grade goals.

Wolters (2004) investigated the relationship of student motivation, cognitive engagement in achievement in mathematics to achievement goal theory and found that self-efficacy ratings accounted for 18% of the variance in course grade (2004). Zimmerman (1998) investigated the role of self-efficacy in writing performance and

reported that 31% of the variance in student grade was accounted for by student self-report measures of self-efficacy (1998).

The review of literature supports the significant impact of metacognition and self-efficacy on a variety of adaptive behaviors, specifically academic achievement. The studies reviewed utilized a wide variety of assessment techniques. Methods of assessing metacognition, specifically regulation of cognition and reading self-efficacy will be reviewed.

<div align="center">Assessment of Metacognition</div>

There has been a variety of approaches to the study of metacognition since Flavell coined the term in the 1970's. Table 1 provides an overview of instruments used in the measurement of metacognition. Structured interviews (Swanson, 1990), checklists and a number of teacher rating scales and online monitoring tasks (Pressely & Gahatala, 1990) have been used to assess both knowledge and regulation of cognition. While structured interviews and in the moment feedback can provide a rich pool of data, this method is time consuming and intrusive. Many researchers have opted to use inventories or questionnaires to tap metacognitive constructs.

Table 1.

Comparison of Metacognitive Assessment Instruments

Scale Name	Author	Construct Measured	Format	r	Intended Group	Norms
The Index of Reading Awareness	Jacobs & Paris, 1987	Regulation & Knowledge of Cognition	Self-report Multiple Choice	0.38 to 0.58	3rd and 5th Grade	No
The Motivated Strategies for Learning Questionnaire	Pintrich, Garcia,& McKeachi, 1991	Self-Regulation and Self-Efficacy	Self-report Lnkert Scale	0.64 to 0.79	High School/ College	No
The Metacompre-hension Strategy Index	Schmitt, 1990	Regulation & Knowledge of Cognition	Self-report Multiple Choice	0.87	Elementary age Students	No
The Jr. Metacog-nitive Awareness Inventory	Sperling, Howard, Miller & Murphy, 2002	Regulation & Knowledge of Cognition	Self- report-Likert Scale	0.76 To 0.82	Form A: Grades 3-5 Form B: Grades 6-9	No
Behavior Rating Inventory of Executive Function	Gioia, Isquith, Guy, & Kenworthy, 2000	Regulation of Cognition	Teacher Report Linkert Scale	0.80 to 0.92	Ages 5 to 18	Yes

The Index of Reading Awareness (IRA) (Jacobs & Paris, 1987), based on the

work of Brown (1987), remediated some, but not all, of the methodological and practical

difficulties of the methods previously mentioned. The main benefit provided by the IRA

was the increased ease of administration.

The Motivated Strategies for Learning Questionnaire (Pintrich, Smith, Garcia &

McKeachie, 1991) was developed within the social constructivist paradigm. The

Learning Strategy subscale is a single scale measurement of both knowledge and

regulation of cognition (Duncan & McKeachie, 2005). The single metacognition score

combined with the lack of an appropriate version for an elementary sample suggests that

the Motivated Strategies for Learning Questionnaire is not suitable for the current study.

The Metacomprehension Strategy Index (Schmitt, 1990) was initially developed to assess the effects of a metacomprehension training program. While a useful tool, quite well suited for classroom level analysis, the Metacomprehension Strategy Index does not tap the three components of regulation of cognition identified in the literature (e.g.,planning, monitoring, and evaluation) (Schraw & Moshman, 1995).

In response to a lack of tools available for use with younger samples, Sperling, Howard, Miller, and Murphy (2002) developed a downward extension of the Metacognitive Awareness Inventory (Shraw & Dennison, 1994)

The Junior Metacognitive Awareness Inventory shares a problem with other self-report formats that is well documented in the literature on self-regulation of learning in general and metacognition in particular. That is the disconnect between what a student knows about their cognition and their actual regulation of their cognition (Brown & Smiley, 1978; Pintrich & Zusho, 2002; Wolters, 1998). A drawback of behavioral approaches to the measurement of metacognition, especially regulation of cognition, is the small sample of behavior. Observation during task completion fails to fully capture metacognitive processes (Sperling, et al., 2002). A similar dilemma has been raised in the neuropsychological literature in discussions of executive function. Burgess (1997) illustrates several negative aspects inherent in current methods of assessing executive function. First, the assessment takes place in a very short period, limiting what can be seen. Second, performance assessments tend to highlight specific parts of executive processes. This piecemeal approach to assessing regulation of cognition does not provide the richness available in assessment focused on long-term everyday behavior.

According to the authors, the *Behavior Rating Inventory of Executive Function* (Gioia, Isquith, Guy, & Kenworthy, 2000) is an ecological solution to the disadvantages

of a finite performance task, inaccurate reports of actual regulation of cognition activities, and limited time (Isquith, Gioia & Espy, 2004). It also provides a somewhat expanded measurement of regulation of cognition consistent with the research of Wolters (2003) and follows the suggestions for future research presented by Schreiber (2005). The metacognitive composite of *The Behavior Rating Inventory of Executive Function (BRIEF)* (Gioia, Isquith, Guy, & Kenworthy, 2000) is composed of five subscales and an overall metacognitive index.

The *Initiate Scale* is a measure of one's ability to begin a task as well as the ability to produce ideas without support. The internal consistency coefficient for the Initiate Scale is 0.80 (Gioia, et al., 2000). *The Working Memory Scale* taps the ability to hold information in short term memory while utilizing or manipulating it for the purpose of maintaining or completing a task or activity. The internal consistency coefficient for the Working Memory Scale is 0.90. *The Plan/Organize Scale* taps into the ability to "anticipate future events; set goals; . . . carryout tasks in a systematic manner; understand and communicate main ideas . . . (p. 2)." The internal consistency coefficient for the Plan/Organize Scale is 0.87. *The Organization of Materials Scale* focuses on the ability to keep the work or play environments conducive to appropriate activities. The internal consistency coefficient for the Organization of Materials Scale is 0.90. *The Monitor Scale* is a measure of an individual's ongoing evaluation both during task completion and post-task self-reflection, to ensure the planned for goal has been reached. The internal consistency coefficient for the Monitor Scale is 0.89. The five subscales reviewed comprise the Metacognition Index. The Index "represents the child's ability to initiate, plan/organize and sustain future-oriented problem solving in working memory "(p. 4). The index represents the individuals' ability to cognitively Self-regulate behavior has

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been shown to be a tremendously important component of students' level of academic achievement independent of ability. Swanson (1990) investigated the relationship between high and low metacognitive knowledge and high and low ability level on a problem-solving task. While the high ability and high metacognitive knowledge group outperformed all others, students with low ability and high metacognitive knowledge consistently outperformed low metacognitive groups independent of their level of ability. Self-regulated learners utilize metacognitive strategies especially at times of high cognitive demand such as during the initial learning stages or while troubleshooting a particular task (Paris & Paris, 2001).

The BRIEF Scale was normed using a sample compatible with the 1999 U.S. Census for sex, socio-economic status, ethnicity, age, and geographic population density (Gioia, et. al. 2000). The sample was recruited in twenty-five schools in Maryland. A sample of students with traumatic brain injury was obtained from Case Western Reserve University in Cleveland, Ohio. Gioia, et al., reports a mean test-retest correlation across clinical scales of 0.81. Test-retest for the metacognition index is reported at 0.88.

Gioia, Isquith, Kenworthy and Barton (2002) provide empirical support for the sensitivity and validity of utilizing *the Behavior Rating Inventory of Executive Function* as a predictor of reading achievement. In their 2002 study of profiles in both acquired and developmental disorders, Gioia, et al., found significant differences between students with developmental reading disorders elevated (maladaptive) and BRIEF subscale ratings of Working Memory and Plan/Organize and Monitor.

Assessment of Self-Efficacy

The literature supports the importance of assessing affective elements in order to increase our understanding of the precursors of self-regulated learning and ultimately

academic achievement (Bandura, 1986, 1997; McCombs & Marzano, 1990; Pintrich & Zusho, 2002; Winne, 1995). Table 2 provides an overview of instruments used to measure a variety of affective variables including self-efficacy.

Table 2.

Comparison of Self-Efficacy Instruments

Scale Name	Author	Construct Measured	Format	R	Intended group	Norms
Self-Description Questionnaire-I	Marsh, 1990	Self-concept	Self-report-Likert scale	0.81 to 0.94	Grades 3-6	Yes
The Perception of Ability Scale for Children	Boersema & Chapman, 1992	Academic Self-concept	Self-report yes/no questions	0.69 to 0.72	Grades 3-6	Yes
Perceived Competence Scale for Children	Harter,1982	Self-perceptions of competence	Self-report Likert scale	0.76 to 0.83	Grades 3-6	Yes
The Motivated Strategies for Learning Questionnaire	Pintric, Garcia,& McKeachie, 1991	Self-Regulation and Self-Efficacy	Self-report LikertScale	0.64 to 0.79	High School/ College	No
The Reader Self-Perception Scale	Henk & Melnick, 1995	Reading self -efficacy	Self- report Likert Scale	0.81 to 0.84	Grades 4-6	No

The Self-Description Questionnaire I (SDQ-I; Marsh 1990) was created to measure multiple areas of self-concept. Boersma and Chapman (1992) created the *Perception of Ability Scale* for use with students in grades three through six. The scale was developed as an affective measure of self-beliefs regarding academic ability.

Harter's *Perceived Competence Scale for Children* (1982) is a frequently utilized well known measure based on Harter's model that competence beliefs vary across domains. The *Perceived Competence Scale for Children* was created to fill the void of appropriate multi-domain measures available to researchers in the early 1980's (Harter, 1982).

The Motivated Strategies for Learning Questionnaire (Pintrich, Smith, Garcia & McKeachie, 1991) also has a measure of self-efficacy. Pintrich et al., describes the self-efficacy scale embedded in the MLSQ ". . . both expectancy for success (which is specific to task performance) and judgments of one's ability to accomplish a task and confidence in one's skill to perform a task are collapsed within the general term *self-efficacy* (p.119)."

The Reader Self-Perception Scale (RSPS) (Henk & Melnick, 1995) was developed to measure student perceptions of reading self-efficacy. Henk and Melnick created the RSPS to reflect the four basic factors students take into account when estimating their capabilities as a reader. These four factors are embedded in Bandura's basic model of self-efficacy. The four factors include Progress defined as "how one's perception of present reading performance compares with past performance" (p. 472). Observational Comparison is defined as "how a child perceives his or her reading performance compares with the performance of classmates". Social Feedback is "includes direct or indirect input about reading from teachers, classmates, and people in the child's family." Physiological States "refers to internal feelings that the child experiences during reading." The scale reliability coefficients range from 0.81 to 0.84.

While the developmental fodder of self-efficacy varies (e.g., mastery experiences, social feedback, observation of peers, and physiological states), the construct is one-dimensional. Shell, Murphy and Bruning (1989) posit a single generalized dimension exists linking self-efficacy beliefs to reading and writing performance. Shell, Murphy and Bruning report reading self-efficacy and outcome beliefs accounted for approximately 32% of the variance of reading achievement. Henk and Melnick (1995) support the utility of a composite view of reading self-efficacy construct stating, "how an individual feels

about him or herself as a reader could clearly influence whether reading would be sought or avoided, the amount of effort that would occur during reading, and how persistently comprehension would be pursued"(p. 472).

The Readers Self-Perception Scale was piloted on 625 students in grades four, five and six. Revisions were made based on exploratory factor analysis yielding four scales: Progress, Observational Comparison, Social Feedback, and Physiological States. Further reliability analysis indicated scale reliabilities ranging from .81 to .84 based on scale completion by 1,479 fourth (n = 506), fifth (n = 571) and sixth grade (n = 402) children in several urban, suburban and rural school districts.

Bong (1996) compared the relative usefulness of self-concept and self-efficacy in relation to academic achievement. Bong indicated that the specificity between task being investigated (e.g., reading), and a focused measure of reading self-efficacy tends to produce more valid assessment and greater effect sizes than does use of a general measure of reading self-concept. Schunk and Pajares (2002) differentiate the conceptual differences between the construct of self-efficacy and academic self-concept, expectancy for success or perceived competence beliefs. Self-efficacy refers to an individual's belief in his/her ability to acquire new information or complete a task or behavior to a prescribed level of performance (Bandura, 1986, 1987). Although similar to self-concept, it differs in significant ways. Self-concept focuses on aspects of self-worth that are a by-product of competence beliefs, while self-efficacy is primarily concerned with beliefs about an individual's capabilities to complete a task (Schunk & Pajares, 2002). While expectancy or perceived competence beliefs are associated with general task initiation and maintenance, the impact is generally more global. Self-efficacy is very specific in nature. The greater the specificity between the domain under investigation e.g., reading

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and the design of the self-efficacy instrument used, e.g., The Reader Self-Perception Scale (Henk & Melnick, 1995) the greater the potential effect size (Pajares, 1996).

Metacognition and Self-Efficacy

The research literature offers varied research findings concerning the relationship between the constructs of self-efficacy and metacognition. McCombs and Marzano (1990) believe metacognition is a required precursor to the development of self-efficacy and self regulated learning. "When self and cognitive system development are not bridged by metacognitive understanding, self-system development is impaired. The consequence is a lack of the experience of volition and of self-efficacy, which inhibits self-regulation" (McCombs & Marzano, 1990, p. 52). Pajares (2002) posits that greater self-advocacy is related to greater use of cognitive and metacognitive strategies regardless of prior achievement or level of ability. Zimmerman (1995), Pintrich (2000c) and Pintrich and Zusho (2002) present the relationship between metacognition and self-efficacy as interactive and complimentary. Research indicates that students with efficacious beliefs displayed greater regulation of cognition which lead to increased self-regulation of learning and better achievement (Bandura, 1989; Pajares & Schunk, 2001; Pintrich & Zusho, 2002). Hattie, Biggs, and Purdie (1996) completed meta-analytic research investigating the effect of affective versus task/strategy interventions on academic achievement

The meta-analysis of 51 studies with the goal of identifying interventions successful in improving student learning. Interventions were grouped into three general areas: task related skills, self-management of learning, or affective components. The interventions examined by Hattie, Biggs and Purdie (1996) were considered beyond the scope of typical classroom based instruction. While the authors provide a variety of

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interpretive categorizations of the data, effect sizes for outcome measures such as academic performance, study skills and affect were reported at 0.57, 0.16, and 0.48 respectively.

They provide a synthesis of their meta-analysis citing three basic recommendations to enhance intervention effectiveness. First, training should be domain specific. Single skill interventions were more effective than multi-component training programs. Second, intervention programs should use tasks similar to the target content. Results indicate that interventions focused on specific skills generalized to similar everyday classroom demands significantly better than trainings disconnected from academic content. Third, effective interventions promote a high level of learner engagement and metacognitive awareness. Research supports that interventions are more effective when students are engaged metacognitvely, being taught the how, when and why of a particular strategies effectiveness. Interventions embedded into the daily routine is more effective in promoting generalization than stand alone intervention. While Hattie, Biggs, and Purdie illustrated the impact of metacognitive interventions on student learning, Sirin (2005) provides information on the positive impact of socioeconomic status on academic achievement.

<div align="center">Socioeconomic Status and Academic Achievement</div>

Research on the impact of family environment has proven fruitful in adding to our understanding of child development. While socioeconomic status, defined in Sirin (2005) as, "individual's or family's ranking on a hierarchy according to access to or control over some combination of valued commodities such as wealth, power, and social status" (p.418). In a meta-analysis of the impact of socioeconomic status on academic achievement, Sirin (2005) reports that socioeconomic status is a moderate predictor of

academic achievement. Sirin (2005) reports effect sizes for parental occupation and parental income, components of socioeconomic status, on academic achievement as .30 and .29, respectively.

Summary

The review of literature illustrates the value of understanding the underlying components of self-regulated learning especially considering the poor reading performance of a number of students (Sweet, 2004). Students who are actively engaged in their learning display higher levels of motivation and academic achievement (Schunk & Zimmerman, 1997). Self-regulation is teachable and appears independent of intellectual ability (Swanson, 1990). Affective, cognitive and executive functions are subcomponents of self-regulated learning. Flavell's (1979) concept of metacognition includes domain knowledge and an affective component referred to as metacognitive experiences. The focus of contemporary research considers metacognition as composed of knowledge and regulation of cognition (Shraw & Moshman, 1995). Knowledge of cognition is an individual's basic understanding of their cognitive resources, and is composed of both declarative (i.e., asking what) and procedural (i.e., asking how) knowledge. Regulation of cognition can be defined as "metacognitive activities that help control one's thinking or learning (p. 354)" such as planning, evaluation and self-monitoring (Shraw & Moshman, 1995). The concept of regulation of cognition has been expanded by the work of Wolters (2003) that effectively links environmental/strategy manipulation that enhance motivation and or effort as a component of regulation of cognition. While students must have domain knowledge to succeed on a given task, the regulation of cognition tends to enhance performance (Butler & Winne, 1995). While many students have adequate knowledge of cognition, Schraw (1994) illustrates the point

that few utilize their capacity to regulate their cognitive processes. While metacognitive processes underlie self-regulation, the value added to our understanding of self-regulated learning by considering students self-efficacy beliefs is considerable.

Self-efficacy is a construct within Bandura's (1986, 1997) Social Cognitive Theory. A basic premise of Social Cognitive Theory frames behavior, including academic achievement within an interactive context of behavior, personal thoughts and beliefs, and conditions present in the environment (Schunk & Pajares, 2002). Self-efficacy is a person's belief in their ability to acquire new information or complete a task or activity to a prescribed level of performance (Bandura, 1986). Self-efficacy judgments are task and situation specific. Self-efficacy beliefs have been tied to increased levels of task persistence (Wolters, 2003), academic achievement (Multon, Brown, & Lent, 1991) goal setting (Locke & Latham, 2002), educational and career aspirations (Bandura, Barbaranelli, Vaprara, & Pastorelli, 2001) and work related performance (Stajkovic & Luthans, 1998). Multiple research studies have supported the positive relationship between students displaying high levels of both self-efficacy and metacognition (Chui, 1998; Haller, Child, & Walberg, 1988; Hattie, Biggs & Purdie, 1996; Multon, Brown & Lent, 1991; Stajkovic & Luthans, 1998). The current research study will investigate the relationship between self-efficacy, a component of Social Cognitive Theory, and regulation of cognition, a component of metacognition, two central constructs embedded in the development of self-regulated learning.

CHAPTER 3

METHODS

The current study investigated the relationships between metacognition, specifically regulation of cognition, reading self-efficacy, and reading achievement in an elementary sample. The contributions of age, socioeconomic status, and sex were also examined.

Design

The study utilized a static group comparison pre-experimental design. Figure 1 shows a representation of the current research design.

$$X_1 \quad O_1 \ O_2$$
$$X_2 \quad O_1 \ O_2$$
$$X_3 \quad O_1 \ O_2$$

Figure 1. Displays a static group comparison pre-experimental design.

While the researcher's goal was to investigate the associations and predictive relationships among the variables of age, sex, socioeconomic status, reading self-efficacy, regulation of cognition on the reading achievement of an intermediate elementary sample as illustrated by Figure 2. The relationships among the control variables of age, sex and socioeconomic status and reading self-efficacy and regulation of cognition were also explored. In addition, the relationship between self-efficacy and regulation of cognition was studied. It is the researcher's hope that the answers to the varied research questions will support the ongoing development of theories related to self-regulated learning and reading achievement.
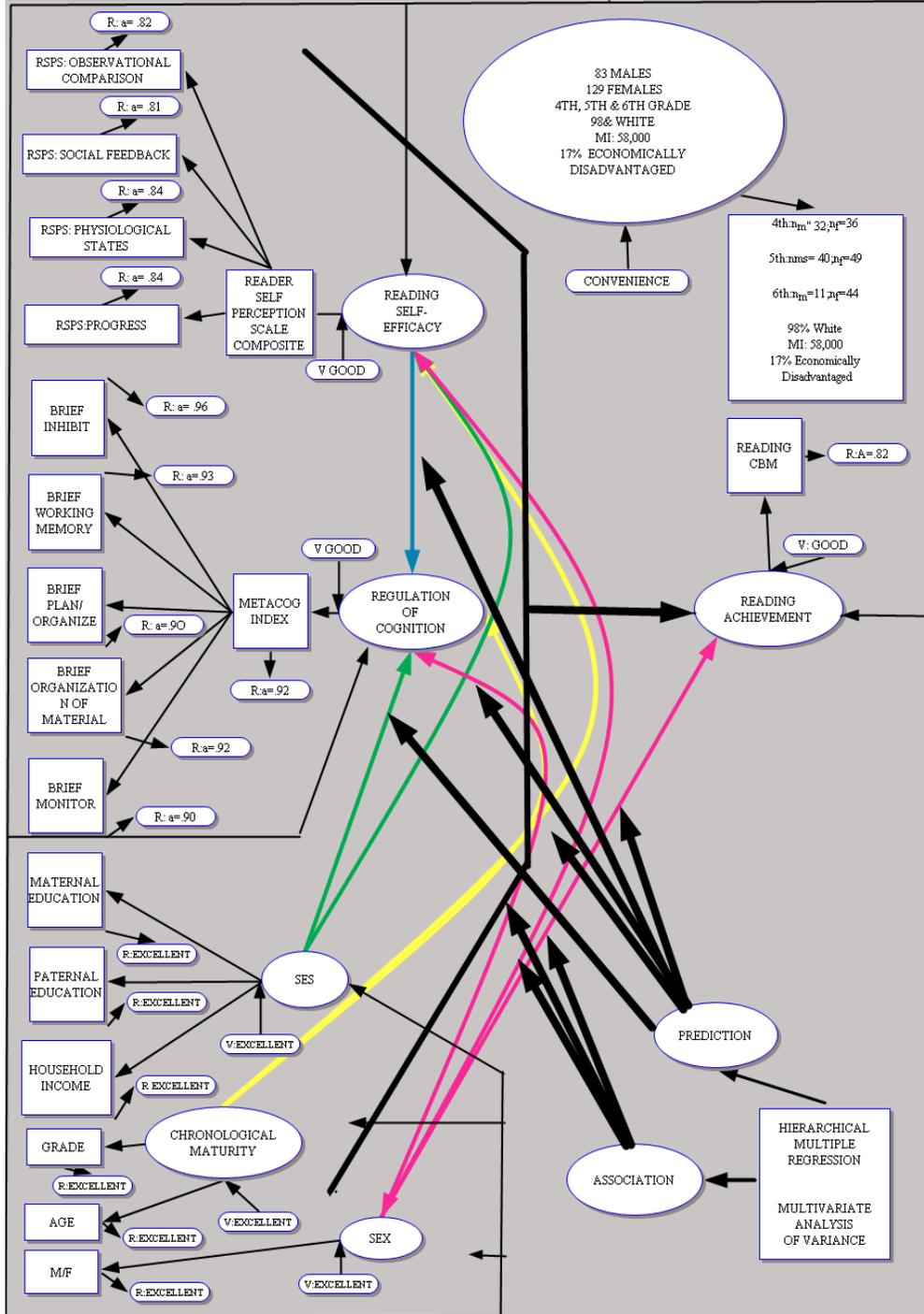
Figure 2. A path diagram illustrating the relationship among the variables age, sex, socioeconomic status, reading self-efficacy, regulation of cognition and the reading achievement of an intermediate elementary sample.

Population

The available population was located in Lycoming County, Pennsylvania. Sixty-four percent of the county population of 118, 395 live in urban areas while thirty-six percent reside in rural areas. Racial/ethnic composition is homogeneous with 94 percent classified as Caucasian. Eighty percent of the population has an earned high school diploma/GED. Fifteen percent of the county's population has an earned bachelors degree or higher. The median salary was 36,891 in 2004. Twelve percent of the county population reports income below the federal poverty line (quickfacts.cencus.gov)

The population for the study included 230 students in grades four, five, and six. The school district is located in rural north-central Pennsylvania. The community consisted of 3500 households with a median household income of $58,000. The community population in 2005 was 8,200 with a median age of 42. The school district was homogeneous in its racial/ethnic makeup with 98% of the students classified as Caucasian. Twenty-two percent of the enrolled students were classified as economically disadvantaged, while 17% were classified as students with disabilities (SchoolMatters, 2006).

Sample

The sample consisted of up to 84 students in grades four, five, and six whose parents/guardians provided informed consent to participate in the study. Table 3 reports the composition of the sample by grade, number and sex. The sample was one of convenience, as the researcher was a contracted psychologist assigned to the district.

Table 3.

Sample by Grade, Number, and Student Sex

Grade	N	Male	Female
4	33	16	17
5	35	15	20
6	15	7	8

Assignment

The assignment of participating students was not random. All teachers had the participating student for instruction. All students with documented informed consent were included in the data collection. In order to control for confounding variables, data of students receiving special education services beyond speech and language support were included in data collection activities but excluded from data analysis.

Measurement

Predictors of interest included student sex, age, and socioeconomic status. The variable of sex was defined as "male" or "female." Students' age was defined as their current chronological age the month of data collection. Grade was defined as their current grade level assignment Socioeconomic status was measured by levels of maternal and paternal education and household income provided via parent report and compared with measures of reading self-efficacy, regulation of cognition, and reading achievement.

Metacognitive behavior was measured by teacher ratings on the *Behavior Rating Inventory of Executive Function (BRIEF)* (Gioia, Isquith, Guy, & Kenworthy, 2000). Reading self-efficacy was measured by student responses on *The Reader Self-Perception Scale* (RSPS)(Henk & Melnick, 1995). The dependent variable, reading achievement, was measured by student performance on an oral reading fluency test. Table 4 provides a description of the measurement characteristics for the current research project including

the research question, latent variable names, observed categories, instruments/source

validity, and reliability

Table 4.

Measurement Characteristics for the Impact of Reading Self-Efficacy and Regulation of Cognition on the Reading Achievement of an Intermediate Elementary Sample Research Project: Research Question, Latent Variable Names, Observed Categories, Instruments/Source Validity, and Reliability for Questions One through Six

Research Question	Latent Variable Name	Observed Categories	Instrument/ Source	Validity	Reliability
1. How is Chronological Maturity measured defined as Age related to Regulation of Cognition, Reading Achievement, and Reading Self-efficacy?	Age Grade Regulation of Cognition Reading Self-Efficacy Reading Achievement	Ages from 9 - 12 years Grades 4-6 BRIEF Scores from: 0.85-1.41 [a] RSPS Composite scores: 79-154 Reading Fluency sores: 73-241	School Records BRIEF Rating Scales/Composite School Records RSPS Scales/Composite	Excellent Good Excellent Good	Excellent Reliability: Alpha= .90-.96 Excellent Reliability: Alpha= .81-.84
2. How is student Sex related to Regulation of Cognition, Reading Achievement, and Reading Self-efficacy?	Sex Regulation of Cognition Reading Achievement Reading Self-Efficacy	Male and Female BRIEF Scores from: 0.85- 1.41 [a] RSPS Composite Scores: 79-154 Reading Fluency scores: 73-241	School Records BRIEF Rating Scales/Composite School Records RSPS Scales/Composite	Excellent Good Excellent Good	Excellent Reliability: Alpha= .90-.96 Excellent Reliability: Alpha= .81-.84
3. How is Socio-Economic Status(SES) related to Regulation of Cognition, Reading Achievement, and Reading Self-efficacy?	Socioeconomic Status: Regulation of Cognition Reading Achievement Reading Self-Efficacy	Maternal /Paternal Education: 9-19 years Household Income: >25,000 – <75,000 BRIEF Scores from: 0.85- 1.41 [a] RSPS Composite scores: 79-154 Reading Fluency sores: 73-241	Parent Report BRIEF Rating Scales/Composite School Records RSPS Scales/Composite	Excellent Good Excellent Good	Excellent Reliability: Alpha= .90-.96 Excellent Reliability: Alpha= .81-.84

Note. BRIEF= Behavior Rating Inventory of Executive Function, (Gioia, Isquith, Guy, & Kenworthy, 2000); RSPS= *The Reader Self-Perception Scale* (Henk & Melnick, 1995)
[a] Represents transformed scores 7-26 is the actual range of raw scores prior to transformation lower scores indicated greater regulation of cognition

Research Question	Latent Variable Name	Observed Categories	Instrument/ Source	Validity	Reliability
4. How is Reading Self-Efficacy and Regulation of Cognition related to Reading Achievement?	Regulation of Cognition	BRIEF Scores from: 0.9-1.1 [a] RSPS	BRIEF Rating Scales/Composite	Good	Reliability: Alpha= .90-.96
	Reading Achievement	Scale Score: 9-45	School Records	Excellent	Excellent
	Reading Self-Efficacy	Reading Fluency sores: 73-224	RSPS Scales/Composite	Good	Reliability: Alpha= .81-.84
5. What is the relationship between Regulation of Cognition and Reading Self-efficacy?	Reading Achievement	BRIEF Scores from: 1.6 -2.1 [a] RSPS	BRIEF Rating Scales/Composite	Good	Reliability: Alpha= .90-.96
	Reading Self-Efficacy	Composite Scores: 9-45	RSPS Scales/Composite	Good	Excellent
					Reliability: Alpha= .81-.84
6. What is the relationship of age, sex, socioeconomic status, reading self-efficacy, and regulation of cognition on reading achievement?	Age/Grade	Ages from 9 -12 years	School Records	Excellent	Excellent
	Sex	Grades 4-6 Male and Female	School Records Parent Report RSPS	Excellent	Excellent
	Socioeconomic Status:	Maternal /Paternal Education: 9-19 years Household Income: >25,000 – <75,000	Scales/Composite	Good	Reliability: Alpha= .90 .96
	Reading Self-Efficacy	BRIEF Scores: 0.85-1.46 [a]	BRIEF Rating Scales/Composite	Excellent	Excellent
	Regulation of Cognition	RSPS Scale Scores: 9-45	School Records	Good	Reliability: Alpha= .81-.84
	Reading Achievement	Reading Fluency Scores: 73-224			

Note. BRIEF= *Behavior Rating Inventory of Executive Function*, (Gioia, Isquith, Guy, & Kenworthy, 2000); RSPS= *The Reader Self-Perception Scale* (Henk & Melnick, 1995)
[a] Represents transformed scores 7-26 is the actual range of raw scores prior to transformation lower scores indicated greater regulation of cognition

Instruments

The Behavior Rating Inventory of Executive Function (Gioia, Isquith, Guy, & Kenworthy, 2000) was chosen to measure metacognitive behavior. The metacognitive index is composed of five sub-scales, each measuring a facet of metacognition. The sub-scales include initiate, working memory, plan/organize, organization of material, and monitor. Table 5 provides behavioral descriptors for each of the *Behavior Rating Inventory of Executive Function* scales.

Table 5.

BRIEF Teacher Form Scale Descriptions

Initiate	Ability to begin a task or activity and to independently generate ideas, responses, or problem solving strategies
Working Memory	Hold information in mind for the purpose of completing a task, stay with, or stick to an activity.
Plan/Organize	Anticipate future events; set goals; . . . carryout tasks in a systematic manner; understand and communicate main ideas…
Organization of Materials	Keep workplace, play areas, and materials in an orderly manner.
Monitor	Check work, assess performance during or after finishing a task to ensure attainment of goal,
Metacognitive Index	. . . ability to cognitively self-regulate tasks and monitor performance

Note. BRIEF= Behavior Rating Inventory of Executive Function, (Gioia, Isquith, Guy, & Kenworthy, 2000, p. 2)

The BRIEF Scale was normed using a sample compatible with the 1999 U.S. Census for gender, socioeconomic status, ethnicity, age, and geographical population density (Gioia, et. al. 2000). The sample was recruited in 25 schools in the state of Maryland. A sample of students with traumatic brain injury was obtained from Case Western University in Cleveland, Ohio. Gioia, et. al reports a mean test-retest correlation across clinical scales of 0.81. Test-retest for the metacognition index is reported at 0.88.

The RSPS (Henk & Melnick, 1995) was chosen to measure student perceptions of

reading self-efficacy. Henk and Melnick created the RSPS to reflect the four basic factors students take into account when estimating their capabilities as a reader. These four factors are embedded in Bandura's basic model of self-efficacy. Table 6 provides a description of the *Reader Self-Perception Scale's* four factors.

Table 6.

The Reader Self-Perception Scale Descriptions

Progress	"how one's perception of present reading performance compares with past performance."
Observational Comparison	"deals with how a child perceives his or her reading performance to compare with the performance of classmates."
Social Feedback	"includes direct or indirect input about reading from teachers, classmates, and people in the child's family."
Physiological States	"refers to internal feelings that the child experiences during reading"

Note. Henk & Melnick, 1995, p. 472

In completing the scale, students are asked to read each item and rate how much they agreed or disagreed with the statement using a five-point likert system (1 = strongly disagree, 2 = disagree, 3 = undecided, 4 = agree, 5 = strongly agree, p. 473). The Readers Self-Perception Scale (Henk & Melnick, 1995) was piloted on 625 students in grades four, five, and six. Revisions were made based on exploratory factor analysis yielding four scales: Progress, Observational Comparison, Social Feedback, and Physiological States. Further reliability analysis indicated scale reliabilities ranging from .81 to .84 based on completion by 1,479 children in several urban, suburban, and rural school districts consisting of fourth (n = 506), fifth (n = 571) and sixth graders (n = 402).

Reading Achievement

Curriculum-based measurement is a well developed and technically strong measurement system. Deno, Fuchs, Marston, and Shin (2001) illustrate the advantages of curriculum-based measurement. Among these are increased content validity and data that is clear and easily communicated to teachers. Curriculum-based measurement is quite sensitive to incremental growth in student reading performance. Oral reading fluency, the metric of curriculum-based measurement assessment in reading, has been shown to be an excellent indicator of student reading competence/achievement. Fuchs, Fuchs, Hosp, and Jenkins (2001) reviewed prior research in support of this premise. In order to compare the validity of oral reading fluency measures to other established measures of reading achievement, Fuchs, Fuchs, and Maxwell (1988) used the reading comprehension subtests of the Stanford Achievement Test (Passage Recall, Question Answering, and a Cloze Comprehension Task) on a 400 word passage. Results indicated criterion validity coefficients (e.g., the average correlations across the different scoring methods) of 0.91 for oral reading fluency, 0.82 for question answering, 0.70 for story recall and 0.72 for the cloze measure. Fuchs, Fuchs, Hosp, and Jenkins (2001) assessed the validity of oral versus silent reading fluency as a measure of reading comprehension. The authors compared oral and silent reading fluency scores with the reading comprehension portion of the Iowa Test of Basic Skills which was administered in large group sessions. Results indicated correlation coefficient of 0.38 for silent reading and 0.84 for oral reading. Coefficients associated with the Iowa Test of Basic Skills were 0.47 for silent reading and 0.8 for oral reading. These studies provide support for the use of oral reading fluency as a valid indicator of overall reading competence/achievement.

Procedure

The timelines associated with the research project, from topic inception to completion, is presented in table 7. In depth discussion of data collection procedures follows. Due to the researcher's status as the school's psychologist, measures were taken to ensure detachment from the sources of potentially sensitive information throughout this study. The researcher had no direct access to sensitive information. All data gathering/clerical transfers of information were completed by colleagues/secretarial staff with no ties to the school district.

Table 7.

Research Project Timelines

Task	Timelines
Seek Research Topic Approval	Summer 2006
Seek Site Sponsor Approval	September 2006
Seek Institutional Review Board Approval	October 2006
Initial Defense of Research Proposal	February 2007
Plan/Collect Data	February- May 2007
Complete Statistical Analysis	June 2007
Ongoing Writing and Revisions	June 2007- January 2008
Final Defense	March 2008
Complete Final Revisions	March/April 2008
Submit to University	April 2008

 Upon completion of the RSPS and the BRIEF this researcher received protocols with tracking numbers only. In addition, independent variable data was given to this researcher

as an Excel file. Only tracking numbers were used to merge the data for analysis. The data collection sequence was as follows:

The department secretary mailed consent forms to all students enrolled in grades four, five, and six based on a list provided by the school principal. In addition, all Teacher Consent Forms were distributed via faculty mailboxes. The consent forms explained the nature, purpose, timeline, confidentiality, and voluntary aspect of the study. The secretary placed a second copy of the teacher consent form in their mailboxes after ten days. A second consent was mailed ten days after the initial mailing to potential participants who had not responded.

In order to ensure that the lead researcher was blind to potentially sensitive information, each returned parental/child consent form was mailed via a stamped enclosed return envelope addressed to Dr. Mary Beth Bianco, Director of Educational Planning at IU 17 and a colleague. Dr. Bianco acted as an independent third party. Dr. Bianco had no relationship with the faculty or students. Dr. Bianco transferred information on income and education to an Excel spreadsheet. As an additional safeguard to confidentiality of sensitive information, Dr Bianco had no knowledge of the income/education levels associated with the income codes provided on the parent consent form. Dr. Bianco prepared a list of students whose parents provided consent for their child to participate and an Excel file with educational and income codes by student tracking number. The lead researcher did not have specific knowledge of income or education levels of student participants. Information was coded by student tracking number. Once the final sample was determined, the researcher prepared the RSPS (Appendix E) and BRIEF protocols (Appendix G). Each rating scale had the student tracking number listed on each page. Dr. Bianco attached a 3x5 card to the front of the

protocol which listed the student's name and teacher who administered the RSPS and/or completed the BRIEF. Prior to data collection, the lead researcher met with participating teachers individually during non-instructional time to review administration procedures of the BRIEF and RSPS.

Participating teachers completed the BRIEF teacher form for the students participating in their classroom within the next seven days. Upon completion, teachers removed the 3 x 5 index card listing the student's name. Only the tracking number remained on the BRIEF protocol. On the seventh day of the BRIEF data collection, teachers administered the RSPS to participating students. Students were directed to remove the 3x5 card with their name on it. None of the protocols were identifiable by student name. The lead researcher obtained Oral Reading Fluency scores for all participating fourth, fifth, and sixth grade students from the school's Title I teacher.

The researcher completed data analysis. All data was analyzed anonymously. No financial compensation was provided to participants in this study, though all of the children received a McDonald's coupon for their participation. The McDonald's coupon was sent home in an envelope addressed to the child and parent(s) enclosed with a note thanking them for their participation in the study. Upon completion of the data collection, participating teachers received a ten-dollar restaurant gift certificate as a token of appreciation. The gift certificate was enclosed in a card of appreciation signed by the lead researcher delivered unobtrusively via faculty mailbox.

Power

There has been little investigation of the impact of metacognition, specifically regulation of cognition and reading self-efficacy. The choice of predictor variables has been based on previous research. Research has indicated a medium effect size ($r = .3$; $d = .5$; $R^2 = .13$) in the relationship of academic self-efficacy and achievement. A medium effect size has also been shown in research devoted to metacognition and its impact on reading. The choice of regression analysis allows one to look at the predictive relationship of metacognition and reading self-concept on reading achievement. Table 8 lists the studies devoted to metacognition, study sample sizes, and effect sizes in support of this premise. Cohen (1992) provides guidance for sample size required to achieve a power of .80. A power of .80 is sufficient in balancing the risk between a Type I and Type II error. The current possible sample of 230 students satisfies the sample requirement of N • 104 + m (number of predictors) for the partial correlation as recommended by Green (1991). Given a medium effect size and an Alpha of .05 the required sample size for a medium effect size equals 109 for five independent variables (e.g., metacognition, self-efficacy, age, sex and socioeconomic status).

Table 8.

Reported Effect Sizes for Metacognition and Academic Outcomes

Study	N	Age	Effect Size
Haller, Child & Wallberg (1988)	N = 1553 students from 20 studies	Varied-all school age	ES= 0.71
Hattie, Biggs & Purdie (1996)	N = 51 studies	Preschool through adult	ES= 0.45
Chiu (1998)	N = 3483 from 43 studies	Elementary	ES = 0.67
Wolters (1999)	N = 88	High school 9th/10th grade	ES= 0.32
Roeschl-Heils et al., (2003)	N = 59	7th/8th grade	ES= 0.44
Bouffard & Vezeau (1998)	N = 178	Longitudinal Through 6th	ES=0.26

Table 9 lists the studies devoted to self-efficacy and academic outcomes and reports

study sample sizes, and effect sizes.

Table 9.

Reported Effect Sizes for Self-Efficacy and Academic Outcomes

Study	N	Age	Effect Size
Multon, Brown & Lent (1991)	N = 38 samples from 36 studies N = 4998	Elementary through college	ES= 0.52
Chan (1994)	N = 105	5th-graders	ES= 0.19
Wolters (2004)	N = 525	Junior High	ES = 0.18
Zimmerman (1998)		High School	ES = 0.31

Statistical Analysis

The first hypothesis analyzed the relationship between student age and the dependent variables of regulation of cognition, as measured by BRIEF and reading self-efficacy, as measured by RSPS and reading achievement, as measured by oral reading fluency data. The researcher's hypothesis is to reject the null hypothesis for reading achievement and regulation of cognition. It is hypothesized that older students will display higher levels of both regulation of cognition and reading achievement (Baker, 2005; Rafoth, 1999; Rafoth, Leal & Defabo, 1993). It is anticipated that no predictive relationship will exist between reading self-efficacy and age (Bouffard & Vezeau, 1998).

What is the relationship between student sex and the dependent variables of regulation of cognition, reading self-efficacy, and reading achievement? The researcher's hypothesis is to accept the null hypothesis for reading achievement, regulation of cognition, and reading self-efficacy. Parjares (2002) reports insignificant sex related differences in ratings of self-efficacy in elementary age children. However, there is a need for additional research in this area to confirm previous findings. Due to the lack of

research, additional information is needed to clarify the relationship of sex to regulation of cognition and reading achievement.

What is the relationship between family socioeconomic status, as measured by household income and level of maternal/paternal education, and the dependent variables of regulation of cognition, reading self-efficacy, and reading achievement? The researcher's hypothesis is to reject the null hypothesis for reading achievement. It is hypothesized that a positive relationship between family socioeconomic status and reading achievement exists, as higher parental education and socioeconomic status is linked to increased levels of achievement (Sirin, 2005). The researcher's hypothesis is to accept null hypothesis for regulation of cognition and reading self-efficacy due to the lack of research investigating this relationship in an intermediate elementary sample.

What is the relationship of reading self-efficacy on reading achievement? The researcher's hypothesis is to reject the null hypothesis. Higher levels of self-efficacy contribute to gains in academic achievement. It is hypothesized that a positive predictive relationship exists between reading self-efficacy and reading achievement (Wigfield & Guthrie, 1997; Multon, Brown & Lent, 1991).

What is the relationship of reading self-efficacy on regulation of cognition? The researcher's hypothesis is to reject the null hypothesis as more efficacious students exhibit better regulation of cognition. It is hypothesized that a positive predictive relationship exists between reading self-efficacy and regulation of cognition (Bandura, 1989; Pajares & Schunk, 2001; Pintrich & Zusho, 2002).

What is the predictive relationship of age, student sex, socioeconomic status, reading self-efficacy, and regulation of cognition on reading achievement? The

researcher's hypothesis is to reject the null hypothesis. It is hypothesized that each

successive block will increase the explained variance of reading achievement.

Table 10 list the research questions, hypothesis, variables, statistical analysis and

statistical assumptions for the research project.

Table 10.

Research Questions, Hypothesis, Variables, Statistical Analysis and Statistical Assumptions for the Impact of Reading Self-Efficacy and Regulation of Cognition on the Reading Achievement of an Intermediate Elementary Sample Research Project for Questions One through Six.

Research Question	Hypothesis	Variables Scores	Statistic	Assumption	Assumptions Appropriateness
1. How is Chronological Maturity measured defined as Age related to Regulation of Cognition, Reading Achievement, and Reading Self-efficacy?	1. Older students will display higher levels of both regulation of cognition and reading achievement 2. No predictive relationship will exist between reading self-efficacy and age	Age/Grade BRIEF RSPS ORF Scores	1. Multiple Regression Analysis 2.MANOVA	1. Continuous Interval/Ratio Data Linearity Absence of Multicolliniarity Homoscedasity No Outliers 2.Catagorical Interval/Ratio Data Multivariate Normality Absence of Multicolliniarity Homogeneity of Variance/ Covariance Matrices	1. Visual Inspection of Data Histogram with Normal Curve Descriptive Statistics Pearson Correlation 2.Visual Inspection of Data Histogram with Normal Curve Descriptive Statistics Pearson Correlation Box M Test Levene's Test
2. How is student Sex related to Regulation of Cognition, Reading Achievement, and Reading Self-efficacy?	1. No significant relationships exist	SEX BRIEF RSPS ORF Scores	Multiple Regression Analysis MANOVA	1. Continuous Interval/Ratio Data Linearity Absence of Multicolliniarity Homoscedasity No Outliers 2.Catagorical Interval/Ratio Data Multivariate Normality Absence of Multicolliniarity Homogeneity of Variance/ Covariance Matrices	1. Visual Inspection of Data Histogram with Normal Curve Descriptive Statistics Pearson Correlation Matrix 2.Visual Inspection of Data Histogram with Normal Curve Descriptive Statistics Pearson Correlation Matrix Box M Test

Note. BRIEF= Behavior Rating Inventory of Executive Function, (Gioia, Isquith, Guy, & Kenworthy, 2000); RSPS= *The Reader Self-Perception Scale* (Henk & Melnick, 1995); ORF= Oral Reading Fluency; MANOVA= Multivariate Analysis of Variance

Research Question	Hypothesis	Variables Scores	Statistic	Assumption	Assumptions Appropriateness
3. How is Socio-Economic Status related to Regulation of Cognition, Reading Achievement, and Reading Self-efficacy?	1 .A positive relationship between family socioeconomic status and reading achievement. 2. No hypothesis is offered due to the lack of research investigating this relationship	Socioeconomic Status Composite Score BRIEF RSPS ORF Scores	Multiple Regression Analysis MANOVA	1. Continuous Interval/Ratio Data Linearity Absence of Multicolliniarity Homoscedasticity No Outliers 2.Catagorical Interval/Ratio Data Multivariate Normality Absence of Multicolliniarity Homogeneity of Variance/ Covariance Matrices	1. Visual Inspection of Data Histogram with Normal Curve Descriptive Statistics Pearson Correlation 2.Visual Inspection of Data Histogram with Normal Curve Descriptive Statistics Pearson Correlation Matrix Box M Test
4. How is Reading Self-Efficacy and Regulation of Cognition related to Reading Achievement?	1. Higher levels of self-efficacy contribute to gains in academic achievement. 2.Higher levels of regulation of cognition contribute to gains in academic achievement	BRIEF RSPS ORF Scores	Multiple Regression Analysis	1. Continuous Interval/Ratio Data Linearity Absence of Multicolliniarity Homoscedasticity No Outliers	1. Visual Inspection of Data Histogram with Normal Curve Descriptive Statistics Pearson Correlation

Note. BRIEF= Behavior Rating Inventory of Executive Function, (Gioia, Isquith, Guy, & Kenworthy, 2000); RSPS= *The Reader Self-Perception Scale* (Henk & Melnick, 1995); ORF= Oral Reading Fluency; MANOVA= Multivariate Analysis of Variance

Research Question	Hypothesis	Variables Scores	Statistic	Assumption	Assumptions Appropriateness
5. What is the relationship between Regulation of Cognition and Reading Self-efficacy?	1. A positive predictive relationship exists between reading self-efficacy and regulation of cognition	BRIEF RSPS Scores	Multiple Regression Analysis	1. Continuous Interval/Ratio Data Linearity Absence of Multicolliniarity Homoscedasticity No Outliers	1. Visual Inspection of Data Histogram with Normal Curve Descriptive Statistics Pearson Correlation
6. What is the relationship of age, sex, socioeconomic status, reading self-efficacy, and regulation of cognition on reading achievement?	1. Each successive block entered into the regression will increase the explained variance of reading achievement.	Age/Grade Sex Socioeconomic Status Score BRIEF RSPS ORF Scores	Hierarchical Multiple Regression Analysis	1. Continuous Interval/Ratio Data Linearity Absence of Multicolliniarity Homoscedasticity No Outliers	1. Visual Inspection of Data Histogram with Normal Curve Descriptive Statistics Pearson Correlation

Note. BRIEF= Behavior Rating Inventory of Executive Function, (Gioia, Isquith, Guy, & Kenworthy, 2000); RSPS= *The Reader Self-Perception Scale* (Henk & Melnick, 1995); ORF= Oral Reading Fluency; MANOVA= Multivariate Analysis of Variance

Summary

The final sample of 84 students from grades four, five, and six came from a possible population of 230 students. The rural location in north central Pennsylvania is quite homogeneous in its racial and ethnic makeup. The researcher utilized a static group comparison pre experimental design. There was no random assignment. The researcher's goal was to investigate the association and predictive relationships among the variables of age, sex, socioeconomic status, reading self-efficacy, regulation of cognition on the reading achievement of an intermediate elementary sample. The variable of sex was defined as "male" or "female." Students' age was defined as their current chronological age the month of data collection. Socioeconomic status was measured by levels of maternal and paternal education and household income. Metacognitive behavior was measured by teacher ratings on the *Behavior Rating Inventory of Executive Function (BRIEF)* (Gioia, Isquith, Guy, & Kenworthy, 2000).

Reading self-efficacy was measured by student responses on *The Reader Self-Perception Scale* (RSPS)(Henk & Melnick, 1995). The dependent variable, reading achievement, was measured by student performance on an oral reading fluency test.

Considerable forethought in planning and implementing procedures were required to limit the researcher's access to sensitive data. A series of regression analysis and multivariate analysis of variance were planned to address the research questions.

CHAPTER 4

RESULTS

Introduction

The researcher's goal in undertaking this study was to explore the relationship of regulation of cognition and reading self-efficacy on the reading achievement of an intermediate elementary sample. Other variables of interest included age, sex, and socioeconomic status. Clarifying the relationships between these variables will aid researchers in the developing a greater understanding of self-regulated learning. This chapter will provide results for each of six research questions. The initial discussion will explore the predictive relationship of control variables (i.e., student sex, age, and socioeconomic status) with the constructs of regulation of cognition, reading self-efficacy and reading achievement. In addition, results exploring the predictive relationship of regulation of cognition and reading self-efficacy on reading achievement will be presented.

The total sample for this research study consisted of 84 students in grades four through six attending a rural elementary school in central Pennsylvania. The sample was obtained from a population of 239 students. All students were invited to participate and were included in the research study upon receipt of a completed parent (see appendix B) and student consent form (see appendix C). Students receiving special education services beyond Speech and Language Support were excluded from the analysis.

Complications

Data collection was preplanned and commenced without complication. All participating students attended school on the day of data collection. Participating teachers complied with procedures.

Computer Programs

All statistical analyses were computed using SPSS: Windows: Advanced Graduate Student Package (Version 11.5)

Analysis

The population of 239 students in grades four, five and six yielded a sample of 84 participants. To determine normality of the data collected, frequency distributions were obtained for all variables. Visual inspection of distributions revealed relative normality for age, grade, socioeconomic status, reading self-efficacy, and reading achievement. Visual inspection of data and histograms revealed positively skewed distributions for the five subscales of the BRIEF (Initiate, Working Memory, Plan/Organize, Organization of Materials and Monitor). Standard z scores were significantly statistically skewed (alpha = .05) with values in excess of the 1.96 threshold (Tabachnick & Fidell, 2001). A statistically significant level of skew is determined by dividing the skew statistic, a component of descriptive statistics, by the standard error. A quotient exceeding 1.96 was considered significant. Additional analysis utilizing trimmed means and a square root transformation were unsuccessful in normalizing the distribution as the skew statistic continued to exceed the 1.96 threshold. Additional analysis were conducted utilizing a logarithmic transformation. This transformation was successful in normalizing the distribution of the BRIEF subtests with skew statistics below the 1.96 threshold (Tabachnick & Fidell, 2001).

Linearity of the data was confirmed through visual inspection of scatter plot and normal probability plots of standardized residuals. Visual inspection revealed possible outliers in the data. The accuracy of the data entered was assessed and found accurate.

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Outliers defined as standardized residual scores with an absolute value greater than three were identified and deleted from each analysis (Tabachnick & Fidell, 2001; Vannoy, 2002).

A correlation matrix was examined to test the assumption of multicollinarity. Results indicate multicolliniarity existed between the BRIEF Working Memory and Plan/ Organize subtests (r = .90). All other variables met the assumption. In order to account for the multicolliniarity between variables the Plan/Organize subtest was omitted as a predictor. A non-significant Box M's test examined the multivariate homogeneity of variances. A Levene's test of homogeneity of variance was conducted on all multivariate analysis of variance/ MANOVA's to determine if the data met the assumption of homogeneity of variance. Results yielded significant findings requiring a rejection of the Null Hypothesis that there is no difference in variances of the dependent variables. Rejecting the null hypothesis indicates a greater chance of committing a Type I error and incorrectly rejecting the Null Hypothesis. While MANOVA and analysis of variance/ANOVA are quite robust to violations of this assumption (Keith, 2005; Tabachnick & Fidell, 2001), a more stringent alpha level for Multivariate Analysis of Variance (alpha = .01) is appropriate. In addition, the equal cell size decrease the chance of committing a Type I error.

Research Question One

The researcher's initial question explored the predictive relationship between student age and the dependent variables of reading self-efficacy, regulation of cognition and reading achievement. The hypothesis is that older students will display higher levels of both regulation and cognition and reading achievement. It is anticipated that no

predictive relationship will exist between reading self-efficacy and age. The salient

dependent variables required to answer this research question include the following:

Reading self-efficacy composite which is the sum of the four subtests of The Reader Self-

Perception Scale: progress, observational comparison, social feedback, and physiological

states.

Regulation of cognition measured by the five subtests of the BRIEF: initiate,

working memory, plan/organize, organization of materials, and monitor.

Reading achievement or oral reading fluency measured in the number of words read per

minute. A simple linear regression was conducted to determine the predictive relationship

between age and reading self-efficacy. Table 11 shows the regression model of age or

leading self efficacy utilizing the composite score of the reader self-perception scale

(Henk & Melnick, 1995). The analysis supported the hypothesis that no predictive

relationship exists between age and reading self-efficacy. The regression was not

significant with age $\beta = -.10$, t $(-.94)$, p $< .349$.

Table 11.

Regression of Age on Reading Self-Efficacy Composite

DESCRIPTIVE STATISTICS--

Variables	N	M	SD	Min to Max
Reading Self-Efficacy Composite	83	122.3	17.01	79 to 154
Age	83	10.9	.7	9.6 to 12.5

CORRELATION MATRIX--

	Reading Self-Efficacy Composite	Age
Reading Self-Efficacy Composite	1.00	−.10
Age	−.10	1.00

Regression Predicting Reading Self-Efficacy Using Age---

Model Fit	R^2	R^2_{adj}
F [1, 81] = 0.887; p = .349	.01	.01

In order to determine the relationship between age and regulation of cognition, a multivariate analysis of variance was conducted. The continuous variable age was transformed to the categorical variable grade for use as a predictor variable within the multivariate analysis of variance. Table 12 reports descriptive statistics for the multivariate analysis of variance results on regulation of cognition and grade. *The Behavior Rating Inventory of Executive Function (*Gioia, Isquith, Guy & Kenworthy, 2000) reports scores on an inverse scale with lower raw scores indicating greater self-regulatory behavior. Table 12 presents BRIEF scale scores as transformed standard scores. The scales were transformed in order to satisfy the normality assumption. Table 12 also provides raw scores prior to transformation for comparison.

Table 12.

Descriptive Statistics for Multivariate Analysis of Variance Results on Regulation of Cognition (BRIEF Initiate, Working Memory, Plan Organize, Organization of Materials and Monitor) and Grade

Variable	Group	n	M		S.D.		Range	
			Transformed	Raw	Transformd	Raw	Transformed	Raw
BRIEF- Working Memory	4	30	1.2	15.13	.1	4.27	1.00 to 1.40	10 to 25
BRIEF-Plan Organize	4	30	1.2	14.77	.1	3.34	1.00 to 1.38	10 to 24
BRIEF- Organization of Materials	4	30	0.9	10.70	.1	4.36	0.85 to 1.32	7 to 21
BRIEF- Monitor	4	30	1.2	14.67	.1	4.10	1.00 to 1.41	10 to 26
BRIEF- Initiate	5	34	0.9	10.12	.1	3.46	0.85 to 1.28	7 to 19
BRIEF- Working Memory	5	34	1.1	13.56	.1	4.27	1.00 to 1.40	10 to 25
BRIEF-Plan Organize	5	34	1.1	13.32	.1	3.34	1.00 to 1.38	10 to 20
BRIEF- Organization of Materials	5	34	0.9	9.12	.1	2.83	0.85 to 1.32	7 to 16
BRIEF- Monitor	5	34	1.1	14.09	.1	2.98	1.00 to 1.41	10 to 20
BRIEF- Initiate	6	13	0.9	10.12	.1	3.03	0.85 to 1.28	7 to 19
BRIEF- Working Memory	6	13	1.0	13.79	.1	4.52	1.00 to 1.40	10 to 25
BRIEF-Plan Organize	6	13	1.0	13.64	.7	3.69	1.00 to 1.38	10 to 24
BRIEF- Organization Of Materials	6	13	0.8	7.85	.1	3.53	0.85 to 1.32	7 to 21
BRIEF- Monitor	6	13	1.0	11.46	.1	3.49	1.00 to 1.41	10 to 26

Note. BRIEF= Behavior Rating Inventory of Executive Function

Table 13 shows the multivariate analysis of variance of age transformed to grade for regulation of cognition. The Multivariate Analysis of Variance supported the

researcher's hypothesis of a positive relationship between regulation of cognition and grade. Wilks' Lambda is significant at F = (10, 140) = 2.27, p = .017

Table 13.

Multivariate Analysis Variance Results on Regulation of Cognition (BRIEF Initiate, Working Memory, Plan Organize, Organization of Materials and Monitor) for Grade

Test Name	Value	F	Hypoth. Df	Error df	p
Pillai's Trace	.27	2.24	10.0	142.0	.018
Wilks' Lambda	.74	2.27	10.0	140.0	.017
Hotelling's Trace	.33	2.29	10.0	138.0	.016
Roy's Largest Root	.27	3.75	5.0	71.0	.004

Post Hoc

Univariate Analysis of Variance

Dependent Variable	Type III Sum of Squares	df	Mean Square	F	p
BRIEF- Initiate	.01	2	.01	0.36	.695
BRIEF- Working Memory	.13	2	.06	4.27	.017
BRIEF- Plan/Organize	.07	2	.03	3.01	.055
BRIEF- Organization of Materials	.12	2	.06	3.58	.033
BRIEF- Monitor	.09	2	.04	4.92	.010

Note. BRIEF= Behavior Rating Inventory of Executive Function

Further univariate analysis indicated the BRIEF monitor, plan/organize, organization of materials and monitor scales were significantly related to grade.

Table 14 shows the simple linear regression conducted to investigate the relationship between reading achievement and age. The regression supported the hypothesis that a positive predictive relationship exists between age and reading achievement. The regression was significant with age ß = .186, t(1.68), p < .01. The model fit data indicates age accounted for 4 percent of the variance of reading achievement.

Table 14.

Regression of Age on Reading Achievement

DESCRIPTIVE STATISTICS---

Variables	n	M	SD	Range
Reading Achievement	81	157.3	38.2	73 to 241
Age	81	10.9	0.8	9.6 to 12.5

CORRELATION MATRIX---

	Reading Achievement	Age
Reading Achievement	1.00	.19
Age	.19	1.00

Regression Predicting Reading Achievement Using Age---

Model Fit	R^2	R^2_{adj}
F [1, 79] = 2.83; p = .01	.04	.04

Variable in Equation

	B	SE B	b	t	p
Age	9.15	5.44	.186	1.68	.01

Research Question Two

The researcher's second question sought to explore the relationship between student sex and the dependent variables of regulation of cognition, reading self-efficacy, and reading achievement. Regulation of cognition, reading self-efficacy, and reading achievement will not differ significantly due to student sex. The salient dependent variables required to answer this research question include the following:

1. Reading self-efficacy composite which is the sum of the four subtests of The

    RSPS: progress, observational comparison, social feedback and physiological

    states.

2. Reading achievement or oral reading fluency measured in words read per minute.

3. Regulation of cognition composed of the five subtests of the BRIEF: initiate,

    working memory, plan/organize, organization of materials, and monitor.

    Table 15 shows the simple linear regression conducted to explore the predictive

relationship between student sex and reading self-efficacy. The regression supports the

hypothesis that no predictive relationship exists between student sex and reading self-

efficacy. The regression was not significant with age ß = –.086, *t* (.76), *p* < .446.

Table 15.

Regression of Sex on Reading Self-Efficacy Composite

DESCRIPTIVE STATISTICS---

Variables	N	Mean	S.D.	Range
Reading Self-Efficacy Composite	81	122.05	17.09	79 to 154
Sex	81	1.54	0.5	1 to 2

CORRELATION MATRIX---

	Reading Self-Efficacy Composite	Sex
Reading Self-Efficacy Composite	1.000	.09
Sex	.09	1.00

Regression Predicting Reading Self-Efficacy Composite Using Sex---

Model Fit	R^2	R^2_{adj}
F [1, 79] = 0.586; p = .446	.007	.007

Table 16 shows the simple linear regression conducted to examine the relationship between reading achievement and student sex. The regression did not support the hypothesis. The regression supports that a positive predictive relationship exists between student sex and reading achievement. The regression was significant with sex ß = .26, *t*(2.38), *p* < .02. Model fit data indicates student sex accounted for 6.7 percent of the variance of reading achievement. Table 16 provides a breakdown of reading fluency means for males and females. Results indicate females displayed higher reading achievement as measured by oral reading fluency data.

Table 16.

Regression of Sex on Reading Achievement

DESCRIPTIVE STATISTICS---

Variables	N	Mean	S.D.	Range
Reading Achievement	81	157.3	38.2	73 to 241
Reading Achievement Females	44	166.4	36.1	73 to 241
Reading Achievement Males	37	146.5	38.4	73 to 212
Sex	81	1.5	0.5	1 to 2

CORRELATION MATRIX--

	Reading Self-Efficacy Composite	Sex
Reading Self-Efficacy Composite	1.00	.25
Sex	.25	1.00

Regression Predicting Reading Achievement Using Sex--

Model Fit	R^2	R^2_{adj}
F [1, 79] = 5.67; p = 0.02	.067	.055

Variable in Equation

	B	SE B	b	t	p
Sex	19.76	8.3	.26	2.38	.02

Table 17 reports descriptive statistics for the multivariate analysis of variance results conducted to determine the relationship between student sex and regulation of cognition. *The Behavior Rating Inventory of Executive Function (*Gioia, Isquith, Guy & Kenworthy, 2000) reports raw scores on an inverse scale with lower raw scores indicating greater self-regulatory behavior. Table 17 presents BRIEF scale scores as transformed standard scores. The scales were transformed in order to satisfy the normality assumption. Table 17 also provides raw scores prior to transformation for comparison.

Table 17.

Descriptive Statistics for Multivariate Analysis of Variance Results on Regulation of Cognition (BRIEF Initiate, Working Memory, Plan/Organize, Organization of Materials and Monitor) and Student Sex

Variable	Group	n	M		S.D.		Range	
			Transformed	Raw	Transformed	Raw	Transformed	Raw
BRIEF-Initiate	Male	33	1.0	11.46	0.1	3.78	0.85 to 1.30	7 to 20
BRIEF-Working Memory	Male	33	1.2	16.03	0.1	5.60	1.00 to 1.40	10 to 28
BRIEF-Plan Organize	Male	33	1.1	15.57	0.1	5.01	1.00 to 1.45	10 to 28
BRIEF-Organization of Materials	Male	33	1.1	11.97	0.1	4.54	0.85 to 1.32	7 to 21
BRIEF-Monitor	Male	33	1.2	16.54	0.1	4.85	1.00 to 1.46	10 to 29
BRIEF-Initiate	Female	44	0.9	9.68	0.1	2.84	0.85 to 1.30	7 to 18
BRIEF-Working Memory	Female	44	1.1	12.86	0.1	4.21	1.00 to 1.45	10 to 25
BRIEF-Plan Organize	Female	44	1.1	13.05	0.1	3.44	1.00 to 1.45	10 to 24
BRIEF-Organization of Materials	Female	44	0.9	8.27	0.1	2.39	0.85 to 1.32	7 to 19
BRIEF-Monitor	Female	44	1.1	12.66	1.1	2.69	1.00 to 1.46	10 to 21

Note. BRIEF= Behavior Rating Inventory of Executive Function

Table 18 shows the multivariate analysis of variance results on regulation of cognition for student sex. The MANOVA does not support the researcher's hypothesis and require a rejection of the null hypothesis.

Wilks' Lambda is significant at $F = (5, 71) = 5.05$, $p = 0.001$. A review of mean scores in

Table 16 indicates girls display greater regulation of cognition than boys.

Table 18.

Multivariate Analysis Variance Results on Regulation of Cognition (BRIEF Initiate, Working Memory, Plan Organize, Organization of Materials and Monitor) for Sex

Test Name	Value	F	Hypoth.Df	Error df	P
Pillai's Trace	.27	5.05	5.0	71.0	.001
Wilks' Lambda	.72	5.05	5.0	71.0	.001
Hotelling's Trace	.36	5.05	5.0	71.0	.001
Roy's Largest Root	.36	5.05	5.0	71.0	.001

Note. BRIEF= Behavior Rating Inventory of Executive Function

Post Hoc

Univariate Analysis of Variance

Dependent Variable	Type III Sum of Squares	df	Mean Square	F	p
BRIEF-Initiate	.03	1	.03	2.12	.149
BRIEF-Working Memory	.08	1	.08	5.08	.027
BRIEF-Plan Organize	.03	1	.03	2.71	.104
BRIEF-Organization of Materials	.26	1	.26	16.26	.001
BRIEF-Monitor	.13	1	.13	14.97	.001

Note. BRIEF= Behavior Rating Inventory of Executive Function

Univariate analysis indicated significant findings for the BRIEF subscales of

working memory, organization of materials, and monitor based on student sex.

Organization of materials accounted for 17.8% of the variance. Working memory and

monitor accounted for 6.3% and 16.6%, respectively. Acceptable power is reported for

BRIEF organization of materials and monitor.

Research Question Three

The researcher's third question sought explored the relationship between family

socioeconomic status and the dependent variables of reading achievement, reading self-

efficacy, and regulation of cognition. It is hypothesized that a positive relationship between family socioeconomic status and reading achievement exists. Reading self-efficacy and regulation of cognition will not vary significantly based on family socioeconomic status. The salient dependent variables required to answer this research question include the following:

1.   Reading achievement or oral reading fluency measured in words read per minute.

2.   Reading self-efficacy composite which is the sum of the four subtests of The Reader Self-Perception Scale: progress, observational comparison, social feedback, and physiological states.

3.   Regulation of cognition composed of the five subtests of the BRIEF: initiate, working memory, plan/organize, organization of materials, and monitor.

A multiple regression was conducted to determine the predictive relationship in between socioeconomic status and reading achievement.

Table 19 shows the regression of socioeconomic status on reading achievement. Socioeconomic status, entered as a block of three indicators, household income, maternal education and paternal education. Household income was collected as a four category forced choice likert scale with income information provided by parents of participating students. Household income choices range from less than $25,000 per year to greater than $75,000 per year. Parent education was measured as years of formal education ranged from nine to nineteen years. The regression supports the hypothesis that a positive predictive relationship exists between socioeconomic status and reading achievement. The regression was significant for socioeconomic status $F(3, 70) = 4.93$, $p < .004$. Maternal education was the significant predictor $\beta = 6.73$, $t(2.99)$, $p < .004$. Household income $\beta = -7.26$, $t(-1.48)$, $p < .143$ and paternal education $\beta = 1.79$, $t(.99)$, $p < .322$

were not significant predictors of reading achievement. Socioeconomic status accounts

for 13.9% of the variance of reading achievement.

Table 19.

Regression of Socioeconomic Status (Household Income, Maternal/Paternal Education)
on Reading Achievement

DESCRIPTIVE STATISTICS---

Variable	n	M	SD	Range
Reading Achievement	74	157.6	36.1	73 to 241
Household Income	74	2.7	0.9	1 to 4
Maternal Education	74	14.5	2.1	10 to 19
Paternal Education	74	14.4	2.6	9 to 19

CORRELATION MATRIX---

	Reading Achievement	Household Income	Maternal Education	Paternal Education
Reading Achievement	1.00	.05	.38	.25
Household Income		1.00	.47	.44
Maternal Education			1.00	.52
Paternal Education				1.00

Regression Predicting Reading Achievement Using Socioeconomic Status (Household Income,
Maternal/Paternal Education)---

Model Fit	R^2	R^2_{adj}
F [3, 70] = 4.93; p = .004	.174	.139

Variable in Equation

	B	SE B	b	t	p
Household Income	–7.26	4.90	–.19	–1.48	.143
Maternal Education	6.73	2.25	.40	2.99	.004
Paternal Education	1.79	1.79	.13	.99	.322

    Table 20 shows the multiple regression conducted to explore the relationship

between socioeconomic status and reading self-efficacy. The multiple regression supports

the hypothesis that no predictive relationship exists between the model of socioeconomic

status and reading self-efficacy. The regression was not significant for socioeconomic

status $F(3,70) = 2.166$, $p < .10$

Table 20.

Regression of Socioeconomic Status (Household Income, Maternal/Paternal Education)
on Reading Self-Efficacy Composite

DESCRIPTIVE STATISTICS---

Variables	n	Mean	S.D.	Range
Reading Self-Efficacy Composite	74	122.2	17.0	79 to 154
Household Income	74	2.7	0.9	1 to 4
Maternal Education	74	14.6	2.1	10 to 19
Paternal Education	74	14.5	2.6	9 to 19

CORRELATION MATRIX---

	Reading Self-Efficacy Composite	Household Income	Maternal Education	Paternal Education
Reading Self Efficacy Composite	1.00	-.14	.12	.11
Household Income		1.00	.47	.44
Maternal Education			1.00	.52
Paternal Education				1.00

Regression Predicting Reading Self-Efficacy Using Socioeconomic Status (Household Income,
Maternal/Paternal Education)---

Model Fit	R^2	R^2_{adj}
F [3, 70] = 2.166; p = .10	.085	.046

Table 21 reports descriptive statistics for the multivariate analysis of variance

results of regulation of cognition and socioeconomic status. *The Behavior Rating*

*Inventory of Executive Function (*Gioia, Isquith, Guy & Kenworthy, 2000) reports scores

on an inverse scale with lower raw scores indicating greater self-regulatory behavior.

Table 21 presents BRIEF scale scores as transformed standard scores. The scales were

transformed in order to satisfy the normality assumption. Table 21 also provides raw

scores prior to transformation for comparison.

Table 21.

Descriptive Statistics for Multivariate Analysis Of Variance Results on Regulation of Cognition (BRIEF Initiate, Working memory, Plan/ Organize, Organization of Materials and Monitor) and Socioeconomic Status (Household Income, Maternal/Paternal Education)

Variable	n	M		SD		Range	
		Transformed	Raw	Transformed	Raw	Transformed	Raw
Household Income	74	2.7	-	0.9	-	1.00 to 4.00	-
Maternal Education	73	2.4	-	1.0	-	1.00 to 4.00	-
Paternal Education	72	2.4	-	1.1	-	1.00 to 4.00	-
BRIEF-Initiate	77	0.9	10.51	0.1	3.36	0.85 to 1.20	7 to 20
BRIEF-Working Memory	77	1.1	14.26	0.1	5.07	1.00 to 1.40	20 to 28
BRIEF-Plan Organize	77	1.1	14.18	0.1	4.34	1.00 to 1.30	20 to 28
BRIEF-Organization of Materials	77	0.9	9.93	0.1	3.93	0.85 to 1.30	7 to 21
BRIEF-Monitor	77	1.1	14.43	0.1	4.24	1.0 to 1.40	10 to 29

Note. BRIEF= Behavior Rating Inventory of Executive Function

Table 22 shows the multivariate analysis of variance of regulation of cognition,

BRIEF initiate, working memory, plan/organize, organization of materials, and monitor

scales and socioeconomic status composed of household income, maternal/paternal

education. The MANOVA did not support the researcher's hypothesis. Wilks' Lambda is

significant at $F = (15, 91) = 2.0$, $p = 0.023$. Results require a rejection of the null

hypothesis. Further univariate analysis was warranted.

Table 22.

Multivariate Analysis of Variance of Regulation of Cognition (BRIEF Initiate, Working memory, Plan Organize, Organization of materials and Monitor) and Socioeconomic Status (Household Income, Maternal/Paternal Education)

	Test	Value	F	Hypoth df	Error df	p
Household Income						
	Pillai's Trace	.35	0.93	15.0	105.0	.525
	Wilks' Lambda	.66	0.95	15.0	91.5	.505
	Hotelling's Trace	.46	0.97	15.0	95.0	.487
	Roy's Largest Root	.37	2.61	5.0	35.0	.041

	Test	Value	F	Hypoth df	Error df	p
Maternal Education						
	Pillai's Trace	.62	1.83	15.0	105.0	.039
	Wilks Lambda	.45	2.00	15.0	91.5	.023
	Hotelling's Trace	1.00	2.14	15.0	95.0	.014
	Roy's Largest Root	.82	5.76	5.0	35.0	.001

	Test	Value	F	Hypoth df	Error df	p
Paternal Education						
	Pillai's Trace	.41	1.10	15.0	105.0	.358
	Wilks' Lambda	.63	1.10	15.0	91.5	.360
	Hotelling's Trace	.52	1.10	15.0	95.0	.364
	Roy's Largest Root	.36	2.53	5.0	35.0	.046

Post Hoc

Univariate Analysis of Variance

Dependent Variable	Type III Sum of Squares	df	Mean Square	F	P
BRIEF-Initiate	.09	3	.03	2.19	.105
BRIEF-Working Memory	.10	3	.03	2.25	.098
BRIEF-Plan/Organize	.04	3	.02	1.51	.227
BRIEF-Organization of Materials	.06	3	.02	1.16	.336
BRIEF-Monitor	.01	3	.01	.48	.692

Note. BRIEF= Behavior Rating Inventory of Executive Function

Post Hoc analysis identified maternal education as a significant predictor for the BRIEF subscale of working memory significant at the .01 level.

Research Question Four

The researcher's fourth question sought to explore the predictive relationship of reading self-efficacy and regulation of cognition on reading achievement. It is hypothesized that a positive predictive relationship exists among reading self-efficacy, regulation of cognition, and reading achievement. The salient dependent variables required to answer this research question include the following:

1.   Reading achievement or oral reading fluency measured in words read per minute. A multiple regression was conducted to determine the predictive relationship between reading self-efficacy and reading achievement.

Table 23 shows results of the regression of reading self-efficacy and reading achievement. The analysis supports the hypothesis that a positive predictive relationship exists between reading self-efficacy and reading achievement. The model was significant for reading self efficacy $F(4, 76) = 6.477$, $p < .001$. The observational comparison scale was the only significant predictor ß $= 0.53$, t (3.82), $p < .001$. The progress scale ß $= -0.01$, t (-0.14), $p < .883$, social feedback ß $= -0.05$, t ($-.41$), $p < .682$, and physiological states ß $= -0.02$, t ($-.23$), $p < .812$ were not significant predictors of reading achievement. Self-efficacy accounted for 21.5 percent of the variance of reading achievement.

Table 23.

Regression of Reading Self-Efficacy (RSPR: Progress, Observational Comparison, Social Feedback and Physiological States) on Reading Achievement

DESCRIPTIVE STATISTICS--

Variable	n	Mean	S.D.	Range
Reading Achievement	81	157.3	38.2	73 to 241
Progress	81	39.3	4.1	30 to 45
Observational Comparison	81	20.8	4.4	10 to 30
Social Feedback	81	32.2	5.6	17 to 45
Physiological States	81	29.8	7.2	9 to 40

CORRELATION MATRIX---

	RA	P	OC	SF	PS
Reading Achievement	1.00	.21	.50	.31	.24
Progress		1.00	.46	.48	.41
Observational Comparison			1.00	.68	.47
Social Feedback				1.00	.49
Physiological States					1.00

Regression Predicting Reading Achievement from Reading Self-Efficacy---------------------------------------

Model Fit	R^2	R^2_{adj}
F [4, 76] = 6.477; p = 0.001	.254	.215

Variables in Equation

	B	SE B	b	t	p
Progress	–0.16	1.08	–0.01	–0.14	.883
Observational Comparison	4.59	1.20	0.53	3.82	.001
Social Feedback	–0.40	0.98	–0.05	–0.41	.682
Physiological States	–0.15	0.62	–0.02	–0.23	.812

Note. RA = Reading Achievement, P = Progress, OC = Observational Comparison, SF = Social Feedback, PS = Physiological States

Table 24 shows the multiple regression conducted to explore the relationship between regulation of cognition and reading achievement. The regression analysis reported in table 24 support the hypothesis that a positive predictive relationship exists

between regulation of cognition and reading achievement. The model was significant for regulation of cognition $F(4,72) = 7.01$, $p < .001$. Working memory was a significant predictor ß = –.66, t(-3.256), $p < .002$. Initiate ß = .05, t (.335), $p < .738$, organization of materials ß = .16, t (1.056), $p < .294$, and monitor   = -.02, t (–.122), p < .903 were not significant predictors of reading achievement. Regulation of cognition accounted for 24% of the variance of reading achievement.

Table 24.

Regression of Regulation of Cognition (BRIEF: Initiate, Working Memory, Organization of Materials, Monitor) on Reading Achievement

DESCRIPTIVE STATISTICS---

Variable	N	M	SD	Range
Reading Achievement	77	160.3	36.7	73.0 to 241.0
BRIEF-Initiate	77	0.9	0.1	0.8 to 1.30
BRIEF-Working Memory	77	1.1	0.1	1.0 to 1.40
BRIEF-Organization of Materials	77	0.9	0.1	0.8 to 132
BRIEF-Monitor	77	1.1	0.1	1.0 to 141

CORRELATION MATRIX--

	Reading Achievement	BRIEF-Working Memory	BRIEF-Initiate	Organization of Materials	BRIEF-Monitor
Reading Achievement	1.00	−.51	−.38	−.29	−.38
BRIEF-Working Memory		1.00	.78	.71	.77
BRIEF-Initiate			1.00	.55	.69
BRIEF-Organization of Materials				1.00	.69
BRIEF-Monitor					1.00

Regression Predicting Reading Achievement from Regulation of Cognition-----------------------------------

Model Fit R^2 R^2_{adj}

F [4, 72] = 7.01, p = 0.001   .280   .240

Variable in Equation

	B	SE B	b	t	p
BRIEF-Working Memory	−187.66	57.63	−.66	−3.25	.002
BRIEF-Initiate	16.46	49.09	.05	.33	.738
BRIEF- Organization of Materials	42.65	40.38	.16	1.05	.294
BRIEF-Monitor	−7.50	61.46	−.02	−.12	.903

Note. BRIEF= Behavior Rating Inventory of Executive Function

Research Question Five

The fifth research question explored the predictive relationship of reading self-efficacy on regulation of cognition. It is hypothesized that a positive predictive relationship exists between reading self-efficacy and regulation of cognition. Due to the ambiguity surrounding the relationship between the constructs of regulation of cognition and reading self-efficacy, the alternate model was explored. The salient dependent variables required to answer this research question include the following:

1. Regulation of cognition or the BRIEF composite, which included the following subtests: initiate, working memory, plan/organize, organization of materials, and monitor

2. Reading self-efficacy composite which is the sum of the four subtests of The Reader Self-Perception Scale: progress, observational comparison, social feedback, and physiological states.

A multiple linear regression was conducted in order to investigate the predictive relationship of reading self-efficacy on regulation of cognition. Table 25 shows the regression of reading self-efficacy and regulation of cognition. Results of the regression reported in Table 25 support the hypothesis that a positive predictive relationship exists between reading self-efficacy and regulation of cognition. The model was significant for reading self-efficacy $F(4, 78) = 3.08$, $p < .021$. Progress $ß = .30$, $t (2.40)$, $p < .019$ and Observational Comparison $ß = –.32$, $t (–2.13$, $p < .036$ were significant predictors of regulation of cognition. Social Feedback $ß = –.09$, $t (–0.32)$, $p < –.57$ and Physiological States $ß = –.06$, $t (–.49)$, $p < .626$ were not significant predictors of regulation of cognition. Reading self-efficacy accounted for 9.2 percent of the variance of regulation of cognition.

Table 25.

Regression of Reading Self-Efficacy (RSPS: Progress, Observational Comparison, Social Feedback, Physiological States) on Regulation of Cognition Composite

DESCRIPTIVE STATISTICS--

Variable	n	Mean	S.D.	Range
BRIEF Composite	83	1.8	0.1	1.6 to 2.1
Progress	83	39.3	4.1	30 to 45
Observational Comparison	83	20.8	4.5	10 to 30
Social Feedback	83	32.3	5.6	17 to 44
Physiological States	83	29.9	7.3	9 to 40
Valid N (listwise)	83			

CORRELATION MATRIX---

	BF	P	OC	SF	PS
BRIEF Composite (BF)	1.00	.09	−.26	−.19	−.13
Progress (P)		1.00	.45	.48	.41
Observational Comparison (OC)			1.00	.68	.46
Social Feedback (SF)				1.00	.51
Physiological States (PS)					1.00

Regression Predicting Regulation of Cognition Using Reading Self-Efficacy----------------------------------

Model Fit	R^2	R^2_{adj}
F [4, 78] = 3.08, p = 0.021	.369	.092

Variable in Equation

	B	SE B	b	t	p
Progress	0.009	.004	.30	2.40	.019
Observational Comparison	−0.009	.004	−.32	−2.13	.036
Social Feedback	−0.002	.003	−.09	−0.57	.570
Physiological States	−0.001	.002	−.06	−0.49	.626

Table 26 shows the multiple linear regression conducted to investigate the relationship between regulation of cognition on reading self-efficacy.

The multiple regression supports the hypothesis no predictive relationship exists between

reading self-efficacy and regulation of cognition. The model was not significant for

reading self- efficacy $F(4, 74) = 0.843$, p < .502

Table 26.

Regression of Regulation of Cognition (BRIEF: Initiate, Working Memory, Organization of Materials and Monitor)on Reading Self-Efficacy (RSPS: Progress, Observational Comparison, Social Feedback, Physiological States)

DESCRIPTIVE STATISTICS--

Variable	n	Mean	S.D.	Range
Self-Efficacy Composite	83	126.12	17.79	80.00 to 159.00
BRIEF- Initiate	83	1.30	0.13	0.85 to 1.30
BRIEF- Working Memory	79	1.40	0.13	1.00 to 1.4
BRIEF- Organization of Materials	83	1.32	0.15	0.85 to 1.32
BRIEF- Monitor	83	1.46	0.12	1.00 to 1.46
Valid Listwise	79			

CORRELATION MATRIX---

	SEC	I	WM	OM	M
Self-Efficacy Composite	1.00	−.18	−.20	−.15	−.18
BRIEF-Initiate		1.00	−.76	.54	.68
BRIEF-Working Memory			1.00	.72	.75
BRIEF-Organization of Materials				1.00	.77
BRIEF-Monitor					1.00

Regression Predicting Regulation of Cognition Using Reading Self-Efficacy------------------------------------

Model Fit	R^2	R^2_{adj}
F [4, 74] = 0.843, p = 0.502	.044	−.008

Note. SEC = Self-Efficacy Composite, BRIEF = Behavior Rating Inventory of Executive Function, I = Initiate, WM = Working Memory, OM = Organization of Materials, M = Monitor

Research Question Six

The sixth research question sought to explore the predictive relationship of age, student sex, socioeconomic status, reading self-efficacy, and regulation of cognition on reading achievement. Table 27 shows the descriptive statistics for the hierarchical multiple regression of age, sex, socioeconomic status, reading self-efficacy and regulation of cognition on reading achievement.

The variables were selected as predictor variables based on previous research. It is the researcher's hypothesis that each variable will increase the explained variance of reading achievement. The salient dependent variables required to answer this research question include the following:

1. Reading achievement or oral reading fluency measured in words read per minute. A hierarchical multiple regression was conducted to explore the relative contribution of each variable on reading achievement.

Table 27.

Descriptive Statistics for the Hierarchical Multiple Regression of Age, Sex, Socioeconomic Status (Household Income, Maternal/ Paternal Education) Reading Self-Efficacy (RSPS: Progress, Observational Comparison, Social Feedback, Physiological States) and Regulation of Cognition (BRIEF: Initiate, <u>Working Memory, Organization of Materials, Monitor) on Reading Achievement</u>

DESCRIPTIVE STATISTICS---

Variable	n	Mean	SD	Range
Reading Achievement	74	158.0	36.09	73.00 to 224.00
Age	74	10.9	0.8	9.80 to 12.50
Sex	74	1.5	0.5	1.00 to 2.00
Household Income	74	2.7	0.9	1.00 to 4.00
Maternal Education	74	14.6	2.1	10.00 to 19.00
Paternal Education	74	14.5	2.7	9.00 to 19.00
Progress	74	39.3	4.2	30.00 to 45.00
Observational Comparison	74	20.9	4.5	10.00 to 30.00
Social Feedback	74	32.0	5.6	17.00 to 44.00
Physiological States	74	29.9	7.2	9.00 to 40.00
BRIEF-Initiate	74	1.0	0.13	0.85 to 1.30
BRIEF-Working Memory	71	1.1	0.12	1.00 to 1.40
BRIEF-Organization of Materials	74	0.97	0.15	0.85 to 1.32
BRIEF-Monitor	74	1.14	0.11	1.00 to 1.46
Valid N (listwise)	71			

Note. BRIEF= Behavior Rating Inventory of Executive Function

Table 28 shows the Pearson Correlation matrix for the hierarchical multiple regression of age, sex, socioeconomic status, reading self-efficacy and regulation of cognition on reading achievement.

Table 28.

Correlation Matrix for the Hierarchical Multiple Regression of Age, Sex, Socioeconomic Status (Household Income, Maternal/ Paternal Education) Reading Self-Efficacy (RSPS: Progress, Observational Comparison, Social Feedback, Physiological States) and Regulation of Cognition (BRIEF: Initiate, <u>Working Memory, Organization of Materials, Monitor) on Reading Achievement</u>

CORRELATION MATRIX--

Variables	RA	Age	Sex	HI	ME	PE
Reading Achievement	1.00	.26	.16	−.02	.34	.20
Age	.26	1.00	.003	−.002	.11	.05
Sex	.16	.03	1.00	.08	−.07	.11
Household Income	−.01	−.002	.08	1.00	.43	.43
Maternal Education	.34	.11	−.07	.43	1.00	.51
Paternal Education	.20	.05	.11	.43	.51	1.00
Progress	.27	−.27	−.16	−.21	−.05	−.04
Observational Comparison	.56	.09	.001	.02	.22	.20
Social Feedback	.41	−.11	.13	−.13	.16	.14
Physiological States	.27	.01	.20	−.12	.08	.003
BRIEF-Initiate	−.30	−.05	−.12	−.06	−.19	−.01
BRIEF-Working Memory	−.45	−.29	−.23	.08	−.10	−.06
BRIEF-Organization of Materials	−.23	−.24	−.40	.01	−.01	−.13
BRIEF-Monitor	−.31	−.25	−.40	.02	−.04	−.05

Note. RA = Reading Achievement, HI = Household Income, ME = Maternal Education, PE=Paternal Education

CORRELATION MATRIX CONTINUED--

Variables	P	OC	SF	PS	I	WM	OM	M
Reading Achievement	.27	.56	.41	.27	−.30	−.45	−.23	−.31
Age	−.27	.09	−.11	.01	−.05	−.29	−.24	−.25
Sex	−.16	.001	.13	.20	−.12	−.23	−.40	−.40
Household Income	−.21	.02	−.13	−.12	−.06	.08	.01	.02
Maternal Education	−.05	.22	.16	.08	−.19	−.10	−.01	−.04
Paternal Education	−.04	.20	.14	.003	−.01	−.062	−.13	−.05
Progress	1.00	.40	.46	.38	.02	.04	.18	.16
Observational Comparison	.40	1.00	.70	.46	−.32	−.30	−.16	−.24
Social Feedback	.46	.70	1.00	.50	−.20	−.27	−.26	−.25
Physiological States	.38	.46	.50	1.00	−.11	−.062	−.11	−.11
BRIEF-Initiate	.02	−.32	−.20	−.11	1.00	.75	.52	.66
BRIEF-Working Memory	.04	−.30	−.27	−.06	.75	1.00	.69	.74
BRIEF-Organization of Materials	.18	−.16	−.26	−.11	.52	.69	1.00	.66
BRIEF-Monitor	.16	−.42	−.25	−.11	.66	.74	.66	1.00

Note. P = Progress, OC = Observational Comparison, SF = Social Feedback, PS = Physiological States, BRIEF = Behavior Rating Inventory of Executive Function, I = Initiate, WM = Working Memory, OM = Organization of Materials, M = Monitor

Table 29 shows the hierarchical multiple regression of age, sex, socioeconomic status, reading self-efficacy and regulation of cognition on reading achievement. Variables were entered into the equation as blocks. The control variables of age, sex and socioeconomic status were entered first as blocks one, two and three. Reading self-efficacy and regulation of cognition were entered as steps four and five based on previous research and hypothesis generated by the researcher.

Table 29.

Hierarchal Multiple Regression Predicting Reading Achievement using Age, Sex, Socioeconomic Status (Household Income, Maternal/Paternal Education), Reading Self-Efficacy (Progress, Observational Comparison, Social Feedback, Physiological States) and Regulation of Cognition (BRIEF Initiate, Working Memory, Organization of Materials and Monitor)

Step 1--

Model Fit	R^2	R^2_{adj}
F=[1, 69]= 5.25; p= .025	.071	.071

Variable in Equation

	B	SE B	b	t	p
Age	12.18	5.31	.26	2.29	.025

Step 2--

Model Fit	R^2	R^2_{adj}	Change in Model Fit	R^2
F [2, 68] = 3.51; p = .035	.094	.067	F = [1, 68] = 1.70 p =.196	.023

Variables in Equation

	B	SE B	b	t	p
Age	11.96	5.29	.26	2.26	.027
Sex	10.41	7.97	.15	1.30	.196

Step 3--

Model Fit	R^2	R^2_{adj}	Change in Model Fit	R^2
F [5, 65] = 4.16; p = .002	.243	.184	F = [3, 65] = 4.26; p = .008	.149

Variables in Equation

	B	SE B	b	t	p
Age	9.60	4.99	.21	1.92	.059
Sex	13.32	7.62	.19	1.74	.085
Household Income	−8.77	4.66	−.23	−1.88	.064
Maternal Education	6.55	2.19	.39	2.98	.004
Paternal Education	0.99	1.72	.07	.57	.56

Step 4--

Model Fit	R^2	R^2_{adj}	Change in Model Fit	R^2
F = [9, 61] = 6.69; p = .001	.497	.432	F = [4, 61] = 7.70; p = .001	.254

Variable in Equation

	B	SE B	b	t	p
Age	10.99	4.59	.24	2.39	.020
Sex	18.04	7.05	.26	2.55	.013
Household Income	−5.92	4.18	−.15	−1.41	.162
Maternal Education	5.56	1.91	.33	2.90	.005
Paternal Education	−0.12	1.47	−.01	−.08	.935
Progress	2.08	0.96	.25	2.14	.036
Observational Comparison	3.57	1.09	.45	3.27	.002
Social Feedback	−0.36	0.90	−.06	−.40	.686
Physiological States	−0.50	0.55	−.10	−.90	.368

Step 5---

Model Fit	R^2	R^2_{adj}	Change in Model Fit	R^2
F [13, 57] = 5.31; p = .001	.548	.445	F = [4,57] = 1.61; p = .183	.051

Variables in Equation

	B	SE B	b	t	p
Age	6.55	5.12	0.14	1.27	.206
Sex	14.38	7.60	0.20	1.89	.064
Household Income	-3.71	4.20	-0.10	-0.88	.381
Maternal Education	5.23	1.98	0.31	2.64	.011
Paternal Education	-0.12	1.50	-0.00	-0.08	.937
Progress	1.94	0.99	0.23	1.94	.056
Observational Comparison	3.25	1.14	0.41	2.84	.006
Social Feedback	-0.68	0.96	-0.11	-0.71	.479
Physiological States	-0.13	0.56	-0.02	-0.24	.808
BRIEF-Initiate	44.57	47.63	0.15	0.93	.353
BRIEF-Working Memory	-117.33	52.63	-0.42	-2.22	.030
BRIEF- Organization of Materials	23.11	36.19	0.09	0.63	.526
BRIEF-Monitor	3.00	54.96	0.01	0.55	.957

Note. BRIEF = Behavior Rating Inventory of Executive Function

Regression results from the entry of the step one variable: Age, supports a positive predictive relationship between age and reading achievement F (1, 69) = 5.25, p < .025. The variable age accounted for 5.7 percent of the variance of reading achievement.

Regression results from entry of the step two variable supports a positive predictive relationship between student sex and reading achievement F (2, 68) = 3.51, p. = .035. Student sex accounts for an additional 2.3 percent of the variance of reading achievement.

Socioeconomic Status composed of household income and maternal/paternal education was a significant positive predictor of reading achievement F (5, 65) = 4.16, p < .002 and accounted for additional 14.9 percent of the variance of reading

achievement. Maternal education was the only significant predictor ß = 6.55, t (2.98), p < .004.

The step four entry of reading self-efficacy was composed of the four subtests of the Reader Self-Perception Scale (e.g. progress, observational comparison, social feedback, and physiological states). Reading self-efficacy was a significant predictor of reading achievement F (9, 61) = 6.69, p < .001. The progress ß = 2.08, t (2.14), p < .036 and observational comparison ß = 3.57, t (3.27), p < .002 scales were significant predictors. The addition of reading self-efficacy explained a statistically significant additional 25.4% of the variance of reading achievement.

Regulation of cognition (BRIEF initiate, working memory, organization of material and monitor) entered as step five provided a significant model fit with F (13, 57) = 5.31, p < .001. The addition of regulation of cognition explained an additional 5.1 percent of the variance of reading achievement. The overall model reports an Adjusted R Square of .445. The full model explains 44.5% of the variance of reading achievement.

Summary

The researcher's first hypothesis explored the relationship between age and reading self-efficacy, regulation of cognition and reading achievement. The three initial hypotheses were supported. Levels of reading achievement and regulation of cognition varied significantly due to age. The relationship between age and reading self-efficacy was not significant.

The researcher's second hypothesis explored the relationship among student sex and reading self-efficacy, reading achievement, and regulation of cognition. One of the researcher's three initial hypotheses was supported. Contrary findings included a significant relationship between student sex and reading achievement. Girls read

significantly more words per minute than boys. Regulation of cognition varied significantly based on student sex. Girls displayed greater regulation of cognition in the areas of working memory, organization of materials, and monitor. There was no significant predictive relationship between sex and reading self-efficacy.

The researcher's third question explored the relationship among socioeconomic status and reading achievement, reading self-efficacy, and regulation of cognition. Two of three initial hypotheses were supported. Socioeconomic status, specifically maternal education, was a significant predictor of reading achievement accounting for 13.9 percent of the variance. As predicted, the relationship between socioeconomic status and reading self-efficacy was not significant. Regulation of cognition, specifically working memory, varied significantly based on maternal education.

The researcher's fourth question explored the relationship among reading self-efficacy, regulation of cognition and reading achievement. Analysis supported the initial hypothesis. Reading self-efficacy, specifically observational comparison, accounted for 21.5 percent of the variance of reading achievement. Working memory, a facet of regulation of cognition, accounted for 24 percent of the variance of reading achievement.

The researcher's fifth question explored the relationship between reading self-efficacy and regulation of cognition. Consistent with prediction, reading self-efficacy was a significant predictor of regulation of cognition. The progress and observational comparison scales accounted for 9.2 percent of the variance of regulation of cognition. The alternate model that regulation of cognition predicted self-efficacy was explored. Consistent with the initial hypothesis, regulation of cognition was not a significant predictor of reading self-efficacy.

The researcher's sixth question explored the relationship of age, sex, socioeconomic status, reading self-efficacy and regulation of cognition on the reading achievement of an intermediate elementary sample. The researcher's initial hypothesis was partially supported. While all of the variables entered into the equation reached significance at the .05 level, the entry of Step 2–sex and Step–5 regulation of cognition did not change the model significantly at the .05 level. The complete model reported maternal education, observational comparison and working memory as significant predictors of reading achievement and accounted for 44.5 percent of the variance of reading achievement.

CHAPTER 5

DISCUSSION

The researcher's goal in undertaking this study was to explore the relationship of regulation of cognition, a facet of metacognition, and reading self-efficacy on the reading achievement of an intermediate elementary sample. This research project attempts to fill a void in the current research literature. While several meta-analytic studies have been conducted investigating constructs associated with academic achievement (Haller, Child & Wallberg, 1988; Valentine, Dubois & Cooper, 2004) none of the studies available for inclusion in the meta-analysis have focused specifically on the relationship between reading self-efficacy and regulation of cognition. The relationship among the variables of age, student sex, and socioeconomic status to reading self-efficacy, regulation of cognition and ultimately reading achievement were also explored. Clarifying the relationships among these variables will aid researchers in developing a greater theoretical understanding of self-regulated learning and in due course reading achievement. This chapter discusses the results for each of six research questions building from the predictive relationship of control variables (i.e., age, student sex, and socioeconomic status) with the constructs of regulation of cognition, reading self-efficacy and reading achievement, to the predictive relationship of regulation of cognition and reading self-efficacy on reading achievement.

Research Question One

The researcher's first hypothesis investigated the relationship of student age and the constructs of regulation of cognition, reading self-efficacy, and reading achievement. Regulation of cognition increased with age as hypothesized. The BRIEF scales of

working memory plan/organize, organization of materials, and monitor were significantly related to age, measured by grade, at the .01 level. This was consistent with past research that found students became more self-regulatory with age (Multon, Brown & Lent, 1991; Rafoth, Leal & DeFabo, 1993; Bouffard & Vezeau, 1998; Pintrinch and Zusho, 2002).

The findings were consistent with Pintrich's (2000c) four phase model presented as a heuristic in identifying elements common among models of self-regulated learning. Phase One involves planning and goal setting. Age, measured by grade, was a significant predictor of the plan/organize scale. The plan/organize scale taps the ability to anticipate future events, set goals and make plans to successfully complete the goal (Gioia, et al, 2000). Phase Two of Pintrich's model involves monitoring processes. The monitor scale reflects the ability to self-monitor performance during the task and self-reflect upon completion (Gioia, et al.,). Phase Three involves the ability to control aspects of self and task (Pintrich,). The working memory and organization of materials scales were significantly predicted by age, measured by grade. Working memory measures the ability to hold and manipulate information in short term memory for the purpose of completing a task or activity. The organization of materials scale focuses on the ability to create an environment conducive for successful task completion (Gioia, et al.,). Pintrich believed development of Phase Two and Three skills should be the main outcome of formal education Klaczynski (2006) concurs indicating meta-monitoring, or the ability to monitor ones own progress while learning is a key developmental task that is not fully developed until adolescence.

While Bandura (1997) indicates the sources of self-efficacy beliefs are developmental in nature, influenced by family environment, mastery experiences, observation, social feedback and physiological states, reading self-efficacy did not

increase with age in the present study. This finding was consistent with the researcher's hypothesis and previous research. Bouffard and Vezeau (1998) found measures of self-efficacy remained stable in a longitudinal study of students in grades four, five, and six. A meta-analysis of interventions focused on increasing self-efficacy conducted by Multon, Brown and Lent (1991)reported smaller effect sizes on self-efficacy ratings of elementary age students. Post intervention self-efficacy scores were higher for both high school and college age students. The restricted age range of the current study may be responsible for the lack of significant findings.

Student reading achievement increased with age as predicted. This result was significant at the .05 level. This finding makes logical sense as students acquire more domain specific knowledge in reading through reading instruction in fourth, fifth and sixth grades. The result was consistent with the initial hypothesis. (Baker, 2005; Rafoth, 1999; Rafoth, Leal & Defabo, 1993).

Research Question Two

The researcher's second hypothesis investigated the relationship among student sex and the constructs of regulation of cognition, reading self-efficacy, and reading achievement. Girls displayed significantly different levels of working memory, monitor and organization of materials than boys. The monitor scale reflects the ability to self-monitor performance during the task and self-reflect upon completion (Gioia, et al., 2000). The working memory and organization of materials scales were significantly predicted by age, measured by grade. Working memory measures the ability to hold and manipulate information in short term memory for the purpose of completing a task or activity. The organization of materials scale focuses on the ability to create an

environment conducive for successful task completion (Gioia, et al., 2000). Results were significant at the .01 level. The result was inconsistent with the initial hypothesis as the relationship of sex and regulation of cognition was not well supported in the research literature. The findings provide additional support for Pajares' (2002) finding that females display a greater tendency to self-regulate learning during early elementary school.

As hypothesized, student sex was not a significant predictor of reading self-efficacy, at the .05 level, across the intermediate elementary school level in this study. While not focused specifically on reading self-efficacy Pajares (2002) failed to find significant differences in self-efficacy between boys and girls. In their longitudinal study, Bouffard and Vezeau (1998) reported similar ratings of self-efficacy for boys and girls in fourth, fifth and sixth grade.

Girls displayed greater reading achievement than males as measured by oral reading fluency data. This result was significant at the .05 level and was not consistent with the researcher's initial hypothesis. The results are also inconsistent with Klein and Jimerson's (2005) study investigating possible bias in oral reading fluency scores. There was no significant difference in oral reading fluency scores based on sex for students in first through sixth grade (Klein & Jimerson, 2005).

<center>Research Question Three</center>

The researcher's third hypothesis investigated the relationship of socioeconomic status defined as a composite of household income, maternal, and paternal education to the constructs of regulation of cognition, reading achievement, and reading self-efficacy. While the specification of socioeconomic status was appropriate for the current study

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based on prior research, maternal education emerged as the only salient predictive variable. Current and subsequent analyses confirm the significance of maternal education rather than the construct of socioeconomic status. Contrary to the researcher's hypothesis maternal education was the only significant predictor of working memory, at the .01 level.

Maternal education was a significant predictor of reading achievement at the .05 level. In a meta-analysis on the impact of socioeconomic status on achievement, Sirin (2005) found income moderately correlated to achievement; however, when income was controlled, parent behavior (e.g. reading in the home) became a significant predictor with a moderate relationship to academic achievement (Serpell, Baker & Sonnenschein, 2005). Hoover-Dempsey, Bassler and Brissie (1992) failed to find significant sex based differences between mothers and fathers behavior in supporting children's learning.

Families selected for participation in the University of Minnesota Longitudinal study were based, in part, on their low socioeconomic status. Despite the restricted range in socioeconomic status, as all participants were below the poverty line, children from higher socioeconomic homes displayed higher levels of academic achievement upon school entry and through the sixth grade. Socioeconomic status was defined as the combination of the revised Duncan Socioeconomic Index (Stevens & Featherman, 1981) and maternal education. While the risk factors of poverty remained, early home environment and family involvement in the educational process were identified as protective factors supporting academic achievement in both reading and math (Jimerson, Egeland & Teo, 1999). A study of low-income families conducted by Englund, Luckner, Whaley and Egeland (2004) drawn from the University of Minnesota's Longitudinal study reported maternal education had a significant direct effect on the quality of

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instruction, intelligence at sixty-four months, first grade parent expectations, and first grade parent involvement in the child's education. Child IQ and quality of instruction were directly related to first grade achievement (Englund, et al., 2006). Maternal education was not a significant predictor of reading self-efficacy. The insignificant results for household income may be related to the economic demographics of the population or the categorization of income during data collection.

<center>Research Question Four</center>

The researcher's fourth question investigated the relationship between reading self-efficacy and regulation of cognition on reading achievement. Reading self-efficacy, specifically observational comparison, predicted reading achievement at the .05 level. This finding is consistent with past research as Wigfield and Guthrie (1997) found levels of self-efficacy related to time spent engaged in reading. The finding is also consistent with the Multon, Brown and Lent's (1991) meta-analytic findings supporting the relationship of reading self-efficacy and reading achievement. In addition to improved reading achievement, individuals with higher levels of self-efficacy displayed greater task persistence and completed more post-secondary training. Wigfield and Guthrie reported highly efficacious students were more engaged in reading. Students reporting greater reading self-efficacy also have better ability to comprehend what they read (Anderson, et al., 1988).

The current study reported observational comparison, a measure a child's perception of his or her reading to the reading ability of classmates, as a significant predictor of reading achievement. Lynch (2002) reported significant correlations between peer comparisons and reading achievement test scores. Eight and nine year old students

informed of their higher scores, relative to peers, displayed increased levels of reading self-efficacy. Meijnen and Guldemond (2002) investigated the construct of observational comparison as a reference process influenced by classroom grouping practices. They reported that grouping methods had significant impact on math achievement scores. The homogenous grouping of students by ability did not support math achievement. Performance for low achieving students actually declined.

The specification for regulation of cognition consisted of the BRIEF (Gioia, et al., 2000) subtests of initiate, working memory, organization of materials and monitor and was appropriate for the current study based on prior research. However, when entered into an analysis as a block variable, working memory emerged as the only salient predictive variable. Current and subsequent analyses confirm the significance of working memory rather than the construct of regulation of cognition. Working memory was the significant predictor of reading achievement. The working memory scale measures the ability to hold and manipulate information in short term memory for the purpose of completing a task or activity. Working memory capacity exhibits significant growth during the upper elementary years (Baker, 2005; Brocki & Bolin, 2004).

Reiter, Tucha, and Lange (2004) investigated the performance of forty-two dyslexic and forty-two non-dyslexic 10-year-old students on various standardized measures of executive functioning. The purpose of the study was to gather information about the executive functioning of dyslexic students. The results reported by Reiter, Tucha, and Lange (2004) support the significant impact of working memory as all of the dyslexic participants displayed significantly weaker performance on tasks of working memory, especially those conducted under time pressure or requiring the recording of processing time.

St. Clair-Thompson and Gathercole (2006) investigated the role of executive functions specifically working memory, inhibition and shifting to the learning abilities of eleven and twelve year old English children. They found support for working memory and inhibition as increased levels related to improved academic performance on national tests of English, Mathematics and Science. Working memory was the most salient determinant of English achievement once inhibition was controlled. St Clair-Thompson and Gathercole suggested working memory asserts a causal role in the development of children's knowledge especially in the domain of reading.

Research Question Five

The researcher's fifth question investigated the relationship between reading self-efficacy and regulation of cognition. Self-efficacy, specifically progress and observational comparison were significant predictors of regulation of cognition at the .05 level. Research supports efficacious students display greater regulation of cognition leading to increased self-regulation of cognition and improved achievement (Bandura, 1989; Pajares & Schunk, 2001; Pintrich & Zusho, 2002).

Nes Ferrara (2005) completed a single subject changing criterion design focused on improving the reading fluency of a less skilled reader. The student reported frustration and embarrassment at her oral reading ability compared to peers and family members. The student was also highly motivated to improve her oral reading skills. The ability to read in church, like her mother, was a highly desired goal. Results support the positive effect of modeling, use of proximal goals, the monitoring of progress on measures oral reading fluency and comparison of her performance to peers. Measures of reading self-efficacy showed general improvement as measured by the *Reader Self-Perception Scale*

(Henk & Melnick, 1995). A focus on mastery learning is consistent with increased levels of persistence and strategy use in spite of difficulties (Stipek & Gralinski, 1996; Wolters, 2003, 1999; Lock & Latham, 2002). The student's active engagement in the intervention through proximal goal setting and self-monitoring were essential components (Nes Ferrra, 2005).

The contrary analysis was not significant at the .05 level. Reading self-efficacy failed to predict regulation of cognition. The findings are inconsistent with the research of McCombs and Marzano (1990) who advocate that the development of metacognition (e.g., regulation of cognition) is a precursor to self-efficacy and ultimately self-regulation. The current study did not confirm the complimentary relationship between self-efficacy and regulation of cognition supported by Zimmerman (1995), Pintrich (2000c) and Pintrich and Zusho (2002).

Research Question Six

The full model of age, sex, maternal education, reading self-efficacy and working memory for 44.5% of the variance of reading achievement. The change in the adjusted R^2 value for each variable is as follows: Age–5.7 percent; Sex–2.3 percent; Maternal Education- 14.9 percent; Reading Self-Efficacy–25.4 percent and Working Memory–5.1 percent. Entry of the variables of age, maternal eduation, and reading self-efficacy changed the F statistic to significance at the .05 level. While entry of the variables of student sex and working memory contributed unique variance to the model, the change in value of R^2 did not reach significance at the .05 level. Maternal education, reading self-efficacy, and working memory, were significant predictors of reading achievement at the .05 level based the hierarchical entry of all variables.

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Maternal education was a significant predictor of reading achievement and accounted for the second-largest amount of variance. Englund, Luckner, Whaley and Egeland (2004) reported multiple significant effects of maternal education on the following: quality of maternal instruction, child's intelligence at sixty-four months, first grade parent expectations, and first grade parent involvement in the child's education. . Chapman and Tunmer (2003) reported phonological awareness and word attack skills were significantly associated with self-efficacy beliefs in emerging readers. Students with better phonological processing and word attack skills reported higher levels of reading self-efficacy and utilized more context strategies than less capable peers. Reading self-efficacy, specifically observational comparison, accounted for the greatest amount of the variance of reading achievement. The significant relationship between reading self-efficacy and reading achievement is consistent with past research (Chan, 1994; Multon, Brown & Lent, 1991; Wigfield & Guthrie, 1997; Wolters, 2004; Zimmerman, 1998). Observational comparison as defined by Henk and Melnick (1995) "..deals with how a child perceives his or her reading performance with the performance of classmates" (p. 472). Lynch (2002) supports the power of peer comparisons. Students with knowledge of their superior ranking, relative to peers, on a measure of reading achievement reported higher levels of reading self-efficacy (Lynch, 2002).

The case study completed by Nes Ferrara (2005) supports the effectiveness of the recommendations provided by Hattie et al., (1996) based on a meta-analysis of successful interventions. Hattie et al., (1996) provided basic recommendations to improve interventions. First, utilize domain specific, single skill, interventions as emphasis on a specific skill improves generalization. Next, the topography of the intervention should

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match the skills real world application. Lastly, an effective intervention requires a high level of learner engagement (Hattie et al., 1996).

The specificity of measurement between reading self- efficacy (e.g., *Reader Self-Perception Scale,* Henk & Melnick, 1995) and oral reading fluency, as the measure of reading achievement, may explain the large amount of variance accounted for by reading self-efficacy. Prior research indicates that the specificity between the task being investigated (e.g., reading), and a focused measure of reading self-efficacy tends to produce more valid assessment and greater effect sizes than does use of a general measure (Bong, 1996; Pajares, 1996).

While working memory did not increase the F statistic to significance, the *BRIEF* (Gioia, et al., 2000) working memory scale was a significant predictor of reading achievement. Previous research has established a significant relationship between working memory and reading (Gioia et al., 2002; Reiter et al., 2004; St. Clair-Thompson & Gathercole, 2006).

In their research on developmental and acquired reading disorders Gioia et al. (2002) indicate the BRIEF subscales of working memory, plan/organize and monitor were significant predictors of reading performance. The lack of significant findings for the BRIEF subscales of initiate, organization of materials, and monitor scales were not anticipated. The lack of specificity to the domain of reading may explain the lack of significance of the initiate, organization of materials, and monitor scales. As previously discussed, the more domain specific the measure, the more valid the result and the greater chance for a significant result (Bong, 1996; Pajares, 1996). The significance of working memory in the current study may be due to the developmental level of the sample. Gathercole, Pickering, Knight and Stegmann (2003) report a significant relationship

between level of working memory and the acquisition of literacy skills and math skills when assessed at age seven. The relationship between working memory and the advanced skills of comprehension and analysis weakens when assessed a second time at age fourteen. Level of working memory continues to be a significant in relation to math achievement at age fourteen. This domain difference may be related to the inverse relationship between domain knowledge and working memory. Pintrich and Zusho (2002) report the capacity of working memory is not as important when sufficient domain knowledge exists.

Summary

The goal in conducting this study was to explore the relationship of regulation of cognition and reading self-efficacy on the reading achievement of an intermediate elementary sample. The current study also investigated relationship among the variables of age, sex, and socioeconomic status to reading self-efficacy, regulation of cognition, and reading achievement. Illustrating the relationships among these variables will aid researchers in developing an understanding of self-regulated learning and ultimately reading achievement.

The researcher's first hypothesis explored the relationship between age and reading self-efficacy, regulation of cognition and reading achievement. The three initial hypotheses were supported. The second research question explored the relationship among student sex and reading self-efficacy, reading achievement, and regulation of cognition. One of the researcher's three initial hypotheses was supported. Contrary findings included a significant relationship between student sex and reading achievement. Girls read significantly more words per minute than boys. Girls displayed greater regulation of cognition in the areas of working memory, organization of materials, and

self monitoring. The working memory and organization of materials scales were significantly predicted by age, measured by grade.

The researcher's third question explored the relationship among socioeconomic status and reading achievement, reading self-efficacy, and regulation of cognition. Two of three initial hypotheses were supported. Maternal education, was a significant predictor of reading achievement accounting for 13.9 percent of the variance. As predicted, the relationship between maternal education and reading self-efficacy was not significant. Working memory varied significantly based on maternal education.

The researcher's fourth question explored the relationship among reading self-efficacy, regulation of cognition and reading achievement. The results supported the initial hypothesis. Reading self-efficacy, specifically observational comparison, accounted for 21.5 percent of the variance of reading achievement. Working memory accounted for 24 percent of the variance of reading achievement. The researcher's fifth question explored the relationship between reading self-efficacy and regulation of cognition. Consistent with prediction and previous research (Bandura, 1989; Pajares & Schunk, 2001; Pintrich & Zusho, 2002) reading self-efficacy was a significant predictor of regulation of cognition. The progress and observational comparison scales accounted for 9.2 percent of the variance of regulation of cognition.

The researcher's sixth question explored the relationship of age, sex, maternal education, reading self-efficacy and working memory on the reading achievement of an intermediate elementary sample. The researcher's initial hypothesis was partially supported. While all of the variables entered into the equation reached significance at the .05 level, the entry of Step 2–sex and Step–5 working memory did not change the model significantly at the .05 level. The complete model reported maternal education,

observational comparison and working memory as significant predictors of reading achievement and accounted for 44.5 percent of the variance of reading achievement.

Internal and External Threats

Sample selection is the main threat to the internal validity of the study. The population and resulting sample was one of convenience. My professional association with the district as a school psychologist made access to the students and teachers via district permission possible. Results from a completely random sample may differ. Differences between those that volunteered to participate and the population as a whole is unknown. The threat of instrumentation must be considered. While teachers were given instruction in completing the BRIEF and proctoring the RSPS, subtle variations may have occurred. The requirement for all students participating to read and sign an informed consent form opens the study to the threat of history. As minor children, students typically are not asked to give informed consent, as that is a generally parental responsibility. The process of providing consent may have altered their perceptions in some subtle way.

Sample size and lack of racial/ethnic diversity is the main threat to external validity. The small sample requires the need for caution in generalizing the results. Sample selection is an additional threat to the external validity of the study. As the sample was one of convenience.

Recommendations for Future Research

The current study focused on the relationships among age, sex, socioeconomic status, reading self-efficacy and regulation of cognition on reading achievement. Future studies should expand on this work by exploring the effects of interactions between these constructs. While providing predictive information regarding the relationship among

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variables, the study does not presume causation. Future research utilizing path analysis techniques would add to this existing work.

The current study supports the importance of affective /motivational variables such as self-efficacy to achievement. As the field of education continues its transition to data based decision making in evaluating effective educational interventions, future research should focus on providing educators with the understanding to consider and the tools to monitor affective progress. Additional research into the grouping practices within general education classes and during intervention periods may provide information useful in increasing the therapeutic effect of general instruction and targeted interventions.

Previous research supports the premise of specificity of assessment, especially in the context of self-efficacy. Assessments closely linked to the outcome variable under investigation tend to be more valid with greater significance (Bong, 1996; Pajares. 1996). The current study raises issues of measurement well suited for future research. While the *BRIEF* provided an ecological measure of regulation of cognition that, by literature review, was well suited for the current study, research into a measure with more specificity to reading is warranted. A recommendation for future research is also appropriate for the RSPS. While quite appropriate for the study, the specificity of the scale to reading may be the reason for the non-significant results on the non-reading related constructs (e.g., age, sex, and socioeconomic status). Future research should consider alternate means of exploring this construct.

Conclusion

As an educator, it becomes apparent that some students cope with the challenges of learning much more efficiently than others. The construct of self-regulation has

generated considerable research as those interested in the mechanisms of learning search to find was to improve pedagogy to the benefit of students in particular and society as a whole. In the current study, *Self-Regulation* is defined as self-generated thoughts, feelings, and actions for attaining academic goals (Zimmerman, 2002). This is accomplished through the regulation and control of cognition, motivation, and behavior. Self-regulation is guided and constrained by both personal characteristics and the contextual features in the environment (Pintrich & Zusho 2002).

While the emphasis of the current study is on the relationship between reading self-efficacy and regulation of cognition, important components in the development of self-regulated learning, and reading achievement; the impact of the demographic variables of age, student sex and socioeconomic status were also considered. Several conclusions are drawn from the results. Reading self-efficacy is a predictor of both regulation of cognition and reading achievement in an intermediate elementary sample. The finding supports the premise that students who are more efficacious about their ability to read, tend to regulate their cognition at a level significantly different from those lower in reading self-efficacy. While positively associated with reading achievement, a significant relationship between regulation of cognition and reading self-efficacy does not exist. As stated by Bandura, Barbaranelli, Caprar, and Pastorelli (1996) "unless people believe that they can produce desired effects by their actions, they have little incentive to act" (p. 1206).

Several conclusions regarding the impact of age, sex and socioeconomic status can be drawn. Results of the current study support the positive relationship between age and regulation of cognition. In the current sample, older students displayed significantly better ability to regulate cognition as measured by the *BRIEF*. While the trend of

improving regulation of cognition with age was supported by prior research (Bouffard & Vezeau, 1998; Multon, Brown & Lent, 1991; Pintrinch & Zusho, 2002; Rafoth, Leal & DeFabo, 1993) the current study's focus on an intermediate elementary sample adds to the existing literature. Significant sex differences among boys' and girls' level of regulation of cognition and reading achievement were revealed. Girls displayed significantly higher levels of both regulation of cognition, specifically working memory, monitor and organization of materials than boys. Girls also displayed significantly better reading achievement. While Pajares (2002) reports sex differences with girls displaying more self-regulatory behavior than boys, the current study increases our understanding within this age group. Maternal education was a significant predictor of reading self-efficacy and regulation of cognition.

Implications for Educators

The benefit of efficacy beliefs to academic achievement in general and reading specifically is documented in the current study and in prior research (Chan, 1994; Multon, Brown & Lent, 1991; Wigfield & Guthrie, 1997; Wolters, 2004; Zimmerman, 1998). While educators have little control over demographic variables (e.g., age, sex, and socioeconomic status), collaboration and education with families can make a difference in a variety of domains (Englund, et al., 2004). Barkley (2006) stresses the need to discuss the importance of self-efficacy with families by defining the construct and providing helpful family-based suggestions. However limited educators feel capable of controlling home variables, much can be done by educators to facilitate the development of self-efficacy beliefs. A first step is to become aware of the efficacy beliefs of our students. The *Reader Self-perception Scale* is one of a many scales available for

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classroom use. Teachers should help students establish a high, but valid, sense of self-efficacy. Differentiated instruction focused on difficult but attainable material in a mastery oriented environment supports the development of efficacious beliefs. Academic competence should be discussed as malleable and independent of fixed ability. Specific tasks or domains should be the focus of discourse and self-reflection, not general statements targeting self-concept of self-esteem (Linnenbrink & Pintrich, 2003).

Activities, such as cooperative learning, reciprocal reading, and explicit skill based instruction with multiple opportunities for modeling and feedback generate feelings of self-efficacy that lead to increased cognitive engagement (Linnenbrink & Pintrich, 2003. Strategy instruction should be embedded as a common classroom activity and provide multiple exemplars and opportunities for practice (Rafoth, 1999; Rafoth, Leal & DeFabo, 1993). School administrators, teachers and psychologists should also consider the implications of grouping practices on student's efficacy beliefs and academic achievement (Meijnen & Guldemond, 2002).

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APPENDICES

Site Sponsor Letter

Muncy School District

Lawrence P. Potash	46 South Main Street	David J. Edkin
Superintendent	Muncy, PA 17756	*Business Administrator/*
lpotash@muncysd.k12.pa.us		*Board Secretary*
	Telephone: (570) 546-3125 Fax: (570) 546-6676	dedkin@muncysd.k12.pa.us

September 21, 2006

Michele S. Schwietz, Ph.D., Chairman
Institutional Review Board for
the Protection of Human Subjects
113 Stright Hall
210 South 10th Street
Indiana PA 15705

Dear Dr. Schwietz,

As Superintendent of Schools for the Muncy School District please accept this letter as documentation of my willingness to act as a site sponsor for Mr. Mark A. Nevill. Mr. Nevill has district permission to engage in doctoral research in accordance with university guidelines and Muncy School district policies.

Sincerely,
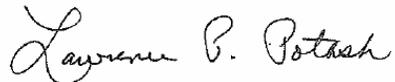
Lawrence P, Potash
Superintendent

APPENDIX B

Parent Consent Form

My name is Mark Nevill. I am a Certified School Psychologist employed by BLaST IU 17 currently working in the Muncy School District. I am working towards a Doctorate in Education: School Psychology at The Indiana University of Pennsylvania. I am required to complete a research study to fulfill the program requirements. The following information is provided in order to help you to make an informed decision whether or not to allow your child to participate. If you have any questions please do not hesitate to ask. Your child is eligible to participate because he / she is a student in the fourth through sixth grade at the Ward L. Myers Elementary School located in the Muncy School District.

Your child is invited to participate in a research study entitled: *The Impact of Reading Self-Efficacy and the Regulation of Cognition on the Reading Achievement of an Intermediate Elementary Sample.*" The main purpose of this study is to explore how feelings about reading and students ability to regulate learning are related to their reading achievement. Additional areas of interest include the affect of student gender, grade, and socio-economic status. It is hoped the results of this research will assist in increasing our understanding of student learning and achievement.

Participation in this study is completely voluntary, and will not affect any evaluation of your child's performance in school. Furthermore, your child may withdraw anytime up to the point of submission of materials. Your response will be considered only in combination with those from other participants. The information obtained in the study may be published in scientific journals or presented at scientific meetings but only as group data. Upon a request to withdrawal from the study, all student information will be destroyed. This research has no bearing on your child's educational program. If you choose to participate, all information will be held in strict confidence.

This study involves three basic steps. First, one of your child's teachers will complete a behavioral rating scale for your child. Next, during the school day one of your child's teachers will read a brief questionnaire which each student will complete. This will take approximately 15 to 20 minutes. For participating in the study, your child will receive a free McDonald's coupon. And last, Muncy School District's oral reading fluency data will be used as a measure of reading achievement. Once again, if at any time your child feels uncomfortable participating in the study he/she may withdraw and will still receive a complementary McDonald's coupon.

There are no known risks or discomforts associated with this research. The project has been approved by the Indiana University of Pennsylvania's Institutional Review Board for the Protection of Human Subjects (Phone: 724-357-7730)

Your child may find the experience enjoyable. The information gained from this study may help us to better understand the variables that contribute to achievement in reading.

In order to measure socio-economic status, information regarding education level of parents/guardians and general information on household income is requested. I fully understand the sensitive nature of this request and have taken measures to ensure the strictest confidentiality. As you can see below, all income information is provided with a letter code. Please write the letter code that corresponds to your range of household income on the signature page as indicated. These codes vary across consents providing additional privacy. Once received by the researcher, numerical codes will replace names throughout data collection and analysis. Once again, all information provided will be grouped together with other participants.

Use code: **NRU**	Use code**: KOS**	Use code**: PTX**	Use code: **QUY**
Income to 24,999.00	25,000.00 to 49,999.00	50,000.00 to 74,999.00	75,000 and above

If you are willing to allow your child to participate in this study, please sign the statement on the next page and promptly return (page XX only) in the envelope provided or to the address listed below. The questionnaire will be administered during December of 2006. If you choose not to participate, please sign the form accordingly and return as directed above.

Thank you for your time and consideration,

Project Director:
Mark A. Nevill, School Psychologist/Doctoral Candidate
Department of Educational and School Psychology, Indiana University of PA
Local contact information:
BLaST IU #17, P.O. Box 3609 2400 Reach Road, Williamsport, PA 17701 570-323-8561
mnevill@iu17.org

Faculty Sponsor:
Mary Ann Rafoth Ph.D. Professor / Dissertation Committee Chair
Department of Educational and School Psychology
242A Stouffer Hall , Indiana University of PA, Indiana, PA 15705 724-357-3784

Site Sponsor:
Mr. Lawrence Potash, Superintendent
Muncy School District, 46 South Main Street
Muncy PA 17756 570-546-3125
CONSENT FORM:
(Parent Copy)

I have read and understand the information on the form and give consent for my child to volunteer as a subject in this study. I understand that all information collected is completely confidential. I understand that I or my child can withdraw at any time. I have received an unsigned copy of this informed consent form to keep in my possession. If you do not want your child to participate please indicate below and return in the envelope provided.

Parent/Guardian Name:_____

Signature:_____Date_____

Child's Name:_____

Child's Tracking Number:_____

_____ I have questions about this research study. Please contact me.

Phone Number or location where you can be reached:_____

Best days and times to reach you: _____

_____I do not want my child to participate in this research study.

I certify that I have provided information to the above individual regarding the nature and purpose, the potential benefits, and possible risks associated with participating in this research study. I have been available to answer any and all questions that have been raised.

_____
Investigator's Signature   Date

Parent(s)/ Guardian(s): Please answer the questions below. All information provided is confidential and will be associated with the child's tracking number- not the child's name.

- Please indicate the years of formal education completed by the child's **mother/guardian**.

  10   11   12   13   14   15   16   17   18   19+
- Please indicate the years of formal education completed by the child's **father/guardian**.

  10   11   12   13   14   15   16   17   18   19+

- Income Code_____

CONSENT FORM:

(Please complete return in the envelope provided)
I have read and understand the information on the form and give consent for my child to volunteer as a subject in this study. I understand that all information collected is completely confidential. I understand that I or my child can withdraw at any time. I have received an unsigned copy of this informed consent form to keep in my possession. If you do not want your child to participate please indicate below and return in the envelope provided.

Parent/Guardian Name:_____

Signature:_____Date_____

Child's Name:_____

Child's Tracking Number:_____

_____ I have questions about this research study. Please contact me.

Phone Number or location where you can be reached:_____

Best days and times to reach you: _____

_____I do not want my child to participate in this research study.

I certify that I have provided information to the above individual regarding the nature and purpose, the potential benefits, and possible risks associated with participating in this research study. I have been available to answer any and all questions that have been raised.

Investigator's Signature   Date

Parent(s)/ Guardian(s): Please answer the questions below. All information provided is confidential and will be associated with the child's tracking number- not the child's name.

- Please indicate the years of formal education completed by the child's **mother/guardian**.

    10   11   12   13   14   15   16   17   18   19+
- Please indicate the years of formal education completed by the child's **father/guardian**.

    10   11   12   13   14   15   16   17   18   19+

- Income Code_____

My name is Mr. Nevill. I am a school psychologist and work in your school a few days a week. I am also a student and need to complete a research study as homework. I would like you to help me with a research study. I am going to tell you about my research study so you can decide if you want to help me or not help me with this study. It is OK for you to ask me questions about the study. My telephone number and e-mail address is listed at the bottom of this page. If you have questions and would like to discuss them with someone else, you can speak to Mrs. Williamson or Mrs. Beaver in the main office. They will be able to answer your questions. I would like you to help me because you are a student in the fourth/fifth/sixth grade at W. L. Myers Elementary School.

I would like to know what students like you think about reading. I will also ask one of your teachers to answer some questions about how you behave in ways that help you learn. An example teacher question might look like this: "Plans ahead for school assignments?"   Helping me with this study will take about 15-20 minutes of your time. You will not miss any important class time. If you would like to help me, one of your teachers will read some questions to you and other children in your class who agree to help. When you receive the answer sheet called a questionnaire, it will have a small card attached with your name on it. When you finish answering the questions read by your teacher, you will be asked to remove the card with your name. Only a number will be left on the questionnaire, so nobody, not even me, will know how you answered. It will work the same way for the teachers. Nothing in this study will be graded.

Nobody will be rude or trick you in any way. You will be asked to listen to a teacher read some questions about reading, decide if you agree or disagree, then circle your answer. An example question might look like this: "I think reading is fun" Some of the questions may be harder to answer.

Your parent(s) know about this and agree that it is okay for you to help me if you want to. You may find the activity fun. You will receive a McDonald's coupon as a thank-you. The things I will learn from this study will help me and others learn more about reading.

No one is making you help me, and you don't have to if you don't want to. If you don't want to help me with the study nothing bad will happen to you. No one will be mad at you. If you decide later that you don't want to be part of my research study, you or your parent/guardian can tell me that by calling, emailing, or writing to me, and I will put all of the answer sheets in the garbage and not include you in my study. If you do want to be in my study, nobody will know your answers, including me. I am asking all of the fourth, fifth and sixth graders in your school to help me, so the information from you and your teacher will just be a little part of the big research study. When I finish my research study, I might talk about what I learned with other people, or write it down so other people can read it, but I will always talk about groups of kids, never about you.

If you would like to help me in my study, please print and sign your name on the top of the yellow signature page. If you do not want to participate please sign at the bottom of

the yellow signature page and return. Please keep the white copy of this form for your records.

Lead Researcher:
Mr. Mark Nevill
BLaST IU 17
P.O. Box 3609
Williamsport PA 1770
E-mail   mnevill@iu17.org
Phone: 570-323-8561 Ext 1026 (BLaST Office)

This project has been approved by the Indiana University of Pennsylvania Institutional Review Board for the Protection of Human Subjects (Phone: 724/357-7730).

CHILD VOLUNTARY CONSENT FORM: SIGNATURE PAGE

(PLEASE RETURN THIS FORM WITH THE PARENT CONSENT FORM)

I understand the information on the form and agree to participate in this study. I understand that no one will know my individual answers. I have the right to change my mind and not participate at any time. I have an unsigned copy (yellow copy) of this informed Consent Form to keep.

Child's Name (PLEASE PRINT)

_____

Child's Signature

_____

Parent/Guardian Signature

_____

Date

 I do not want to participate in this study.

Child's Name (PLEASE PRINT)

_____

Child's Signature (PLEASE PRINT)

_____

Parent/Guardian Signature

_____

Date

Dear Teacher's Name,

My name is Mark Nevill , and I work as a school psychologist for BLaST Intermediate Unit 17. I am also doctoral student at the Indiana University of Pennsylvania, and currently in the dissertation phase of my program. My research study is entitled "*The Impact of Reading Self-Efficacy and the Regulation of Cognition on the Reading Achievement of an Intermediate Elementary Sample"*. The information gained from the study may help us to better understand the variables that contribute to achievement in reading.

This letter is to both inform you of my study, as well as request your participation. Please note that all participation is completely voluntary, and has absolutely no affiliation with Muncy School District or BLaST Intermediate Unit 17. Therefore, should you choose not to participate, there will be no adverse consequences to your employment. You may withdraw from the study at any time by contacting me at the address or phone number listed below.

This study involves three basic steps. First, as a participating teacher, you will be asked to complete an 86 question behavioral rating scale called the BRIEF on one or more of your students. This scale takes approximately 8 minutes to complete, and requires no scoring on your part. Next, you will be asked to read a brief questionnaire which each participating student will complete. This will take approximately 15 to 20 minutes. Each child who participates in the study will receive a free McDonald's coupon. In appreciation for your time, a luncheon will be provided in the faculty room during the data collection for all faculty.

All information gathered in the study will have the full and complete consent of both parents and students. A parent or student may withdraw consent at any time throughout the process. By giving consent, the researcher will have access to information provided by parents, questionnaire responses provided by students, rating scale responses provided by teachers and access to the Muncy School District's oral reading fluency data.

All individual responses will be held in strict confidence, and only group results will be analyzed and reported. The information obtained in the study may be published in a scientific journal or presented at a scientific meeting, but all identities will be confidential. The testing will occur during the month of December 2006.
There are no known risks or discomforts associated with this research. The project has been approved by the Indiana University of Pennsylvania's Institutional Review Board for the Protection of Human Subjects (Phone: 724-357-7730).

If you are willing to participate in this study, please sign the statement on the next page and promptly return (page XX only) in the envelope provided or the address listed below.

If you choose not to participate, please sign the form accordingly and return as directed above.

Thank you for your time and consideration,

Project Director:
Mark A. Nevill, School Psychologist/Doctoral Candidate
Department of Educational and School Psychology, Indiana University of PA
BLaST IU #17, P.O. Box 3609 2400 Reach Road, Williamsport, PA 17701 570-323-8561

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Mary Ann Rafoth Ph.D. Professor / Dissertation Committee Chair
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242A Stouffer Hall , Indiana University of PA, Indiana, PA 15705 724-357-3784

Site Sponsor:
Mr. Lawrence Potash, Superintendent
Muncy School District, 46 South Main Street
Muncy PA 17756 570-546-3125

TEACHER CONSENT FORM

I have read and understand the information on the form and consent to participate in this study. I understand that all information collected is completely confidential. I understand that I can withdraw at any time. I have received an unsigned copy of this informed consent form to keep in my possession.

Teacher Name:_____

Signature:_____Date_____

Grade:_____

I certify that I have provided information to the above individual regarding the nature and purpose, the potential benefits, and possible risks associated with participating in this research study. I have been available to answer any and all questions that have been raised.

_____

Investigator's Signature   Date

_____

APPENDIX E

The Reader Self-Perception Scale

Listed below are statements about reading. Please follow along carefully as I read each statement. Then circle the letters that show how much you agree or disagree with the statement. Use the following:

SA = Strongly Agree

A = Agree

U = Undecided

D = Disagree

SD = Strongly Disagree

Example: **I think pizza with pepperoni is the best.**

SA   A   U   D   SD

If you are *really positive* that pepperoni pizza is the best,

circle SA (Strongly Agree).

If you *think* that it is good but maybe not great, circle A (Agree).

If you *can't* decide whether or not it is best, circle U (Undecided).

If you *think* that pepperoni pizza is not all that good, circle D (Disagree).

If you're *really positive* that pepperoni pizza is not very good, circle SD (Strongly

Disagree).

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Teacher, 48*, 470-482. Copyright 1995 International Reading Association.

1. I think I am a good reader.

   SA   A   U   D   SD

2. I can tell that my teacher likes to listen to me read.

   SA   A   U   D   SD

3. My teacher thinks that my reading is fine.

   SA   A   U   D   SD

4. I read faster than other kids.

   SA   A   U   D   SD

5. I like to read aloud.

   SA   A   U   D   SD

6. When I read, I can figure out words better than other kids.

   SA   A   U   D   SD

7. My classmates like to listen to me read.

   SA   A   U   D   SD

8. I feel good inside when I read.

   SA   A   U   D   SD

9. My classmates think that I read pretty well.

   SA   A   U   D   SD

10. When I read, I don't have to try as hard as I used to.

    SA   A   U   D   SD

Tracking Number:_____

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11. I seem to know more words and other kids when I read.

SA   A   U   D   SD

12. People in my family think I'm a good reader.

SA   A   U   D   SD

13. I am getting better at reading.

SA   A   U   D   SD

14. I understand what I read as well as other kids do.

SA   A   U   D   SD

15. When I read, I need less help than I used to.

SA   A   U   D   SD

16. Reading makes be feel happy inside.

SA   A   U   D   SD

17. My teacher thinks I am a good reader.

SA   A   U   D   SD

18. Reading is easier for me than it used to be.

SA   A   U   D   SD

19. I read faster than I could before.

SA   A   U   D   SD

20. I read better than other kids in my class

SA   A   U   D   SD

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21. I feel calm when I read.

   SA   A   U   D   SD

22. I read more than other kids.

   SA   A   U   D   SD

23. I understand what I read better than I could before.

   SA   A   U   D   SD

24. I can figure out words better than I could before.

   SA   A   U   D   SD

25. I feel comfortable when I read.

   SA   A   U   D   SD

26. I think reading is relaxing.

   SA   A   U   D   SD

27. I read better now that I could before.

   SA   A   U   D   SD

28. When I read, I recognize more words than I used to.

   SA   A   U   D   SD

29. Reading makes me feel good.

   SA   A   U   D   SD

30. Other kids think I'm a good reader.

   SA   A   U   D   SD

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31. People in my family think I read pretty well.

    SA   A   U   D   SD

32. I enjoy reading.

    SA   A   U   D   SD

33. People in my family like to listen to me read.

    SA   A   U   D   SD

34. I think I am a good reader.

    SA   A   U   D   SD

35. I can tell that my teacher likes to listen to me read.

    SA   A   U   D   SD

36. My teacher thinks that my reading is fine.

    SA   A   U   D   SD

37. I read faster than other kids.

    SA   A   U   D   SD

38. I like to read aloud.

    SA   A   U   D   SD

39. When I read, I can figure out words better than other kids.

    SA   A   U   D   SD

40. My classmates like to listen to me read.

    SA   A   U   D   SD

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41. I feel good inside when I read.

    SA   A   U   D   SD

42. My classmates think that I read pretty well.

    SA   A   U   D   SD

43. When I read, I don't have to try as hard as I used to.

    SA   A   U   D   SD

44. I seem to know more words and other kids when I read.

    SA   A   U   D   SD

45. People in my family think I'm a good reader.

    SA   A   U   D   SD

46. I am getting better at reading.

    SA   A   U   D   SD

47. I understand what I read as well as other kids do.

    SA   A   U   D   SD

48. When I read, I need less help than I used to.

    SA   A   U   D   SD

49. Reading makes be feel happy inside.

    SA   A   U   D   SD

50. My teacher thinks I am a good reader.

    SA   A   U   D   SD

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51. Reading is easier for me than it used to be.

    SA   A   U   D   SD

52. I read faster than I could before.

    SA   A   U   D   SD

53. I read better than other kids in my class

    SA   A   U   D   SD

54. I feel calm when I read.

    SA   A   U   D   SD

55. I read more than other kids.

    SA   A   U   D   SD

56. I understand what I read better than I could before.

    SA   A   U   D   SD

57. I can figure out words better than I could before.

    SA   A   U   D   SD

58. I feel comfortable when I read.

    SA   A   U   D   SD

59. I think reading is relaxing.

    SA   A   U   D   SD

60. I read better now that I could before.

    SA   A   U   D   SD

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61. When I read, I recognize more words than I used to.

    SA   A   U   D   SD

62. Reading makes me feel good.

    SA   A   U   D   SD

63. Other kids think I'm a good reader.

    SA   A   U   D   SD

64. People in my family think I read pretty well.

    SA   A   U   D   SD

65. I enjoy reading.

    SA   A   U   D   SD

66. People in my family like to listen to me read.

    SA   A   U   D   SD

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BRIEF Rating Scale

Sample Items from the BRIEF: Teacher Form

Initiate Subscale Example: Is Not a Self Starter

Working Memory Subscale Example: Has Trouble Finishing Tasks (chores, homework)

Monitor Subscale Example: Has Poor Understanding of Own Strengths and Weaknesses