TEACHERS' BELIEFS AND PRACTICES ABOUT SELF-REGULATED LEARNING IN SECONDARY MATHEMATICS CLASSROOMS

By

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To Chad and Lauren

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LIST OF TERMS

Discourse	All verbal communication between the teacher and students, in both directions, as well as communication between students
Metacognition	“Thinking about thinking”; knowing what one knows
SRL	Self-regulated learners are students who proactively direct their behaviors, motivation, and strategies toward their goals

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The purposes of this study were to examine the relationship between high school mathematics teachers' reported beliefs and practices about self-regulated learning with observed classroom instruction, to examine differences in reported beliefs and practices when compared by grade level, subject, course taught, and number of years teaching experience, and to determine whether they was a relationship between reported beliefs and reported practices. Secondary mathematics teachers (n=37) completed a survey about their beliefs and practices about self-regulated learning. Four teachers agreed to participate in classroom observations. Each of the four teachers was observed on three or four occasions for a combined total of 22 hours. Statistical analyses were conducted on the survey data; domain analysis was completed on the field notes from classroom observations. Findings from the classroom observations were compared to survey results to confirm or refute findings from the survey.

Five themes emerged from classroom observations – student as teacher, teacher questioning, teacher emphasis on note-taking, individualized help, and students helping students. Practices that support the facilitation of self-regulated learning were observed within the themes of teacher questioning and students helping students. While survey

results showed that teachers reported using instructional practices practices daily and weekly to promote the development of self-regulation in students these practices were not observed in classrooms. There was a significant relationship between number of years teaching experience and teachers' reported beliefs. Additionally, there was a significant interaction between number of years teaching and teachers' reported beliefs when controlling for grade level taught. The findings in this study show the incongruence between teachers' reported beliefs and observed practices and showcase the need for professional development aimed at helping teachers learn how to promote SRL during instruction. Studied aimed at revealing the relationship between teachers' beliefs and practices about SRL have the potential to improve student learning and outcomes. Increasing teachers' use of SRL can help ensure that U.S. students are able to compete globally in mathematics and compete with students around the world especially in science, technology, engineering, and mathematics (STEM).

CHAPTER 1
INTRODUCTION

Self-regulated learning is described as a process whereby students or learners who are motivationally, behaviorally, and metacognitively "active participants in their own learning" (Zimmerman, 1986, p. 5)**.** These learners proactively direct their behaviors and strategies to help them achieve their goals. Cleary and Zimmerman (2004) write, "Self-regulation involves learners who proactively direct their behavior or strategies to achieve self-set goals" (p. 538). Many researchers and educators have studied and written about self-regulated learning and its benefits (Boekaerts, 1997, 1999; Bronson, 2000; Nota, Soresi, & Zimmerman, 2004; Pintrich, 2000; Randi & Corno, 2000; Schunk & Zimmerman, 1998; Winne, 1995; Zimmerman, 2000, 2002; Zimmerman & Schunk, 1995, 2000, 2002). Self-regulated learners are more effective learners than those who are not self-regulated. In the context of mathematics, self-regulated learners are better problem solvers. (Pape & Wang, 2003; Zimmerman & Martinez-Pons, 1986, 1988, 1990). A self-regulated learner will have different strategies and tools to use to try to solve a problem, such as working backwards or making a table. He or she will use these strategies without being explicitly told to while a student who is not self-regulated will wait for someone to tell him or or her what steps to take to solve a problem.

Students in the United States of America fail to compete globally in mathematics instruction. Teachers need to think more deeply about how they are teaching and self-regulated learning for their students. It is important to develop students into self-regulated learners so that they are best prepared to compete with students from all nations, especially in the fields of science, technology, engineering, and mathematics

(STEM). Students who are self-regulated learners are more skilled in problem-solving, which leads to increased educational and professional opportunities in the STEM fields.

Teachers can facilitate the development of self-regulated learning behaviors and skills within their students. Classroom discourse and communication is one of the primary mediums for teachers to reach their students. Teachers have the option to ask questions, to scaffold teaching, or introduce discussions that facilitate the students' development of self-regulated learning behaviors. To support students becoming self-regulated learners, teachers must orchestrate the classroom discourse. However, for many reasons, not all students are taught how to be self-regulated learners because not all teachers effectively facilitate the development of self-regulated learning strategies. While they are theoretical suppositions about how to teach students to become self-regulated and how to set-up classroom contexts to facilitate the development of self-regulation (Pape, Bell, & Yetkin, 2003; Hadwin, Wozney, & Pontin, 2005), little is actually known about what teachers do during mathematics instruction to support the development of self-regulation. Again, researchers contend that the benefits of students who are self-regulated are substantial and that educators should be doing everything possible to develop this skill within students (Randi & Corno, 2000; Zimmerman, 2002).

Self-regulated learning (SRL) is an important skill to possess and utilize. This is especially true in the domain of mathematics because self-regulated learners are better problem solvers. SRL students are not only motivated to become engaged with their work, they are also motivated to persist and continue working towards their goals. Randi and Corno (2000) suggested that self-regulated learning is both an aptitude and an outcome of schooling. Although most educators want students to be self-regulated

learners, they recognize they they must take time to develop this skill set within our students (Randi & Corno, 2000).

Mathematics classes require students to demonstrate the tenacity to continue working towards solutions even after unsuccessful attempts because much of this discipline focuses on problem solving. Students need to be self-regulated learners so that they can become motivated to: (a) continue working towards solutions, (b) use different tools and methods to solve problems, and (c) make changes as necessary to become successful. Self-regulated learning is understandable and noticeable in its need in mathematics classrooms. Self-regulated learning is not just something of interest or of importance in mathematics classrooms, it is the starting point for this study.

Classroom discourse, or communication, is an important area for study as it is defined and included through a social cognitive perspective. From this perspective, self-regulated learning is defined as a process that occurs through the interactions of the person, his behavior, and his environment (Zimmerman, 2000). Taken together, these three aspects help a person become a self-regulated learner.

Communication is the medium of discourse in classrooms that allows the teacher to convey knowledge and skills to his or her students. Teachers may or may not utilize communication to its utmost potential during instruction. Through classroom discourse students can become self-regulated learners and take on the responsibility for their own learning. Self-regulated learners are able to persevere in the face of difficulty. It is just not mathematics educators' goals to tell students how to solve a mathematics problem and then have students problem solve. A more encompassing purpose is to teach and guide students to become self-regulated learners so that they know how to take and

solve problems in mathematics through completion while taking the responsibility for doing so.

Discourse is central in the classroom environment. Although teachers and students are both involved in classroom discourse, often one of the two will assume greater control. To help foster an environment of self-regulated learning, classroom discourse must be utilized resourcefully, to engage all students, and to ensure their participation in their learning. Thus, it is the teacher's responsibility to correctly guide and use classroom discourse so that students are actively involved in their learning. Also, it is also important that researchers explore how students participate in classroom discourse and what they are contributing. To better understand teachers' and students' use of classroom discourse for student learning during mathematics these processes were explored during classroom instruction in this study.

Purpose of the Study

What factors influence one teacher to utilize classroom discourse in a manner to facilitate students becoming self-regulated learners while other teachers do not? Do teachers' beliefs and practices about self-regulated learning have an effect? The purpose of this study was to examine how teachers used classroom discourse to facilitate the development of self-regulated learning behaviors in students through the classroom discourse during mathematics instruction and to compare how discourse compared with teachers' reported practices for developing self-regulated learners. There has been an abundant amount of research about developing self-regulated learning skills in students, but almost no research on what affects teachers (Winne, 1995; Zimmerman, 2002, 2000). This study examined teachers' reported beliefs and

practices about self-regulated learning and their relationship with observed classroom instruction. What teachers report and what actually happens may not be aligned.

Research Questions

1. What themes emerged from teacher observations?
2. How do teachers support self-regulated learning use in mathematics classes during instruction?
3. What are the differences between teachers' reported beliefs and practices about self-regulated learning when compared by grade level taught?
4. To what extent do teachers' numbers of years teaching experience explain the variation in teachers' reported beliefs and practices about self-regulated learning?
5. What is the relationship between teachers' reported beliefs and reported practices about self-regulated learning?

These research questions will be studied using both qualitative and quantitative research methods. Research question one will require the use of both qualitative and quantitative data analysis methods while the remaining questions will be answered using quantitative methods. The inclusion of qualitative data analysis will provide an approach that will allow the researcher to either confirm or refute the survey results.

Significance of the Study

Previous research has focused on how self-regulated learning skills are beneficial to students (Boekaerts, 1997; Pape, Bell, & Yetkin, 2003; Zimmerman, 2002, 2000). Other studies have focused on studying the ability to teach self-regulated learning skills to students (Dembo & Eaton, 2000; Mason & Shriner, 2007). Many studies have also used students' self-reports of behaviors and attitudes when attempting to measure self-regulated learning skills (Chen, 2002; Dahl, Bals, & Turi,

2005). The present study will focus on the teachers' self-reported of beliefs and practices, and behaviors while teaching mathematics and developing self-regulated learners. It is important to conduct base-line studies such as this one to better understand what teachers are doing to develop self-regulated learning skills in students before attempting to measure students' use of SRL skills.

This study will be significant because it will look at the relationship between teachers' knowledge and beliefs about self-regulated learning, and what they are actually doing within the context of developing self-regulated learners within the mathematics classroom and domain. The reports of knowledge, behaviors, and what actually occurs may be similar or different. However, documenting this relationship, or lack of, will be significant when considering the benefits of self-regulated learners.

The findings of this study will also provide an estimate of where teachers are and where they think they are in terms of developing self-regulated students through their practices. The findings from this study will show the relationships between teachers' reported beliefs and practices about self-regulated learning, and actual classroom instruction. This study will also demonstrate if teachers' beliefs about self-regulated learning have an impact on their actual instruction and practice in their mathematics class.

Limitations

1. Findings from this study will be generalizable only to similar high school mathematics teachers and students.
2. A second limitation of this study will be a small sample size. The labor-intensive nature of observations for each participant will limit the sample in size. This is an inherent limitation of qualitative research.

3. An additional limitation to this study is the development of the survey instrument. It is a new instrument and is likely to undergo changes after this first implementation.
4. Self-report measures are limited because of their dependence on participants' willingness to answer honestly. There is also a chance that the participants will not understand the question or that they do not interpret it as it was intended. These possibilities are also inherent limitations of using self-report measures.
5. Furthermore, there is the possibility of social desirability bias (Crowne & Marlowe,1960). There is the possibility that participants will answer questions in ways that they believe are most favorable or preferred by the researcher.
6. The results of this study are temporal and are limited to this study and its participants at this particular time. The results are not representative of instruction across the school year; they are a snapshot in time.

CHAPTER 2
LITERATURE REVIEW

Communication allows the teacher to convey knowledge and skills to his or her students. However, not all teachers utilize classroom communication effectively. Classroom discourse provides opportunities for students to learn how to self-regulate so that they can take on the responsibility of their own learning. Self-regulated learners have been characterized as individuals who are able to persevere in the face of difficulty as they learn or solve a problem. Becoming a self-regulated student is essential when learning and working in mathematics. Teachers should not simply tell students how to solve a mathematics problem. Instead it is essential that students are taught to be self-regulated learners so that they know how to solve problems in mathematics on their own from beginning to end. However, not all students are taught how to be self-regulated learners because not all teachers effectively facilitate the development of self-regulated learning in students. What beliefs do teachers hold about self-regulated learning and its benefits to students? In what ways do teachers use classroom discourse to develop self-regulated learning among students? The purpose of this study was to examine how teachers used classroom discourse opportunities to facilitate the development of self-regulated learning behaviors among students during mathematics instruction. This chapter will provide an overview of literature that is relevant to the importance of and need for this study.

Theoretical Framework

"Researchers interested in social cognition examine cognitive processing of social information" (Bronson, 2000, p.18). The cognitive processing of social information theory provides the framework for this study. Examining how teachers use classroom

discourse to facilitate the development of students' self-regulated learning can be studied through a social cognitive lens because of the social aspect of classroom discourse, the cognitive element of students' metacognition, and the area of developmental psychology that pertains to the development of self-regulated learning (SRL). Self-regulated learning is a complex skill set that must be developed within individuals – it is not simply acquired. According to Zimmerman (1995), "self-regulation is not a generalized human trait, ability, or cognitive stage or development, but rather a complex interactive process involving not only metacognitive components but also motivational and behavioral components" (Zimmerman, 1995, p. 220).

Social cognitive theory provides a framework and means for studying the relationship between classroom discourse and the development of self-regulated learning strategies in students. This theory and the model of self-regulation provide a means for examining the relationship and understanding it. Self-regulation has been defined as a cyclical multi-phase process from the social cognitive perspective (Schunk & Zimmerman, 1998; Zimmerman, 2000). Forethought, performance or volitional control, and self-reflection are the phases of self-regulation (Zimmerman, 2000). Forethought refers to task analysis and self-motivation beliefs are those thoughts that occur before engaging in a project or situation. Task analysis refers to goal setting and strategic planning while self-motivation beliefs entail self-efficacy beliefs, interest or value in the task, outcome expectations, and goal orientation. A person who is self-regulated will engage in some or all of these components of forethought before undertaking a task. Working proactively, this person will establish what needs to be done to reach the intended goal.

Performance or volitional control consists of both self-control and self-observation once already engaged in a task. These are the processes that help the person become focused on a task, sustain working on it,, remain attentive or motivated (volitional control), and keep track of their progress. Self-reflection, the third phase, refers to both self-judgment and self-reaction. Engaging in self-judgment allows a person to look at him or herself and judge how well they performed compared to the goal previously defined. Not only does the person judge how they performed relative to the defined goal, he or she will also react to his or her own performance. Self-regulated learners are less likely to assert that they lack ability when a goal is not achieved. They are more likely to attribute failure to a shortcoming, mistake, or insufficient effort. The reactions the person has will in turn affect his-her motivation and self-efficacy beliefs during following forethought experiences as the process repeats itself (Zimmerman, 2000).

Social constructivist theory relates to a group of people working together, but focuses on the individual's learning that takes place because of his or her participation and interactions within the group. This theory, primarily attributed to Vygotsky, is also a central component of this study because learning is attributed to the social setting and group interactions and communications. Vygotsky's theory includes the concept of 'inner speech' in which a person takes something socially constructed and internalizes it into his or her own. He described inner speech as a source of knowledge and self-control. Zimmerman and Schunk (2001) explained that Vygotsky's view of self-regulation was distinct because of 'its emphasis on linguistically mediated social agents in children's development and in the functional role of inner speech" (p. 26). This study's

focus on classroom discourse as a source for facilitating the development of self-regulated learners is aligned with Vygotsky's theory because students have the opportunity to take from information and skills learned from the class discussion and make it their own.

Teaching Mathematics

There are many facets of mathematics education that must be considered when thinking about mathematics, including how it is taught and how students learn. Several theories and ideas exist about best practices for student achievement and researchers have investigated teaching mathematics from a variety of viewpoints. For example, the debate remains between the instructional method requiring the rote memorization of mathematics facts and the method of letting students discover and learn the concepts through working on a problem. The National Council of Teachers of Mathematics (NCTM) asserts that mathematics should be conceptually taught. Additionally, the NCTM has written its" Principles and Standards" declaring, "Students' understanding of mathematics, their ability to use it to solve problems, and their confidence in, and disposition toward, mathematics are all shaped by the teaching they encounter in school" (2000, pp. 16-17). Teachers have an impact on students' learning and therefore affect student achievement. Likewise, the American Council on Education (ACE) stated, "The success of the student depends most of all on the quality of the teacher" (1999, p.5). Below follows a brief review of a few research studies that describe teaching mathematics and others that describe how teaching mathematics can be accomplished so that optimal results for student achievement occur.

Mathematics teachers may or may not have taken many mathematics education courses in preparation for their teaching career. Monk (1994) conducted a study looking

at the preparation of secondary mathematics and science teachers and its effect on student learning gains. Using longitudinal data from the Longitudinal Survey of American Youth, Monk concluded that how much a teacher knows about the subject he or she teaches has a positive effect on student learning gains. However, these effects diminish over time and vary for different types of students. The definition of how much a teacher knows about their subject for his study was equated with how many courses the teacher took in the subject area. While there was a positive relationship between the number of courses in the teacher took in the subject area and student gains, Monk also found that courses in pedagogy also had positive effects and, in some instances, greater effects than course work in mathematics itself. This study is noteworthy because it suggests that the preparation of the teacher impacts student learning gains. Similar results were found in a study conducted by Laurie Zuelke (2008) who examined the relationship between the preparation of science teachers and students' FCAT achievement results.

Similar to the previous study, Swafford, Jones, and Thornton (1997) studied the effects of teacher preparation and knowledge. Forty-nine middle school teachers, grades four through eight, participated in a four-week program as part of a three-year professional development project funded by the National Science Foundation. The program consisted of a content course in geometry and a seminar in van Hiele theory. The van Hiele theory "describes five levels of geometric understanding, sequential ordering – recognition, analysis, informal deduction, formal deduction, and rigor" (p.469). Researchers gave participants a pre-test and post-test measuring their geometric content knowledge and their level of thinking in regards to the van Hiele

theory. In addition, eight teachers were part of follow-up observations. The researchers found that teachers' had significant gains in content knowledge and in van Hiele theory. In addition, they found differences in teachers' instruction during observations. The researchers explained, "the effect on instructional practice of increased content knowledge and research-based knowledge of student cognition in geometry was apparent in what was taught, how it was taught, and the characteristics teachers displayed" (Swafford, Jones, & Thornton, 1997, p. 467). These results are important because improved changes in instructional practices led to improved changes in student performance and understanding. Teacher preparation for teaching mathematics is important for both the teacher and in terms of student learning and performance

In addition to teacher preparation for teaching, it is important to investigate how teachers are teaching. There is a variety of instructional methods employed by teachers. Widely agreed is that how teachers teach matters in regards to student learning in mathematics as well as in other content areas. Ma and Papanastasiou (2007) conducted a study investigating six different instructional methods and looked at how they affected student performance in six mathematical areas when introducing a new topic in mathematics. They chose focusing on when a new topic is introduced because this is the beginning point of instruction. The six mathematical areas for this study included mathematics as a whole, algebra, data analysis, fraction, geometry, and measurement. Instructional methods of particular interest in this study included the teacher explaining the rules and definitions, students looking at the textbook while the teacher talked about it, and the teacher trying to solve an example related to the new topic. Results showed that the methods of the teacher explaining the rules and definition

and the students looking in the textbook while the teacher talked had little effect on students' performance in the six mathematical areas of interest. The instructional method of the teacher trying to solve an example problem related to the new topic was effective across all six mathematical areas for promoting student learning gains and performance. This study is important because it tells educators that teaching mathematics successfully does not rely solely on the teacher's preparation and background, but on how they are teaching and the care with which teachers take to explain problems solving. Mathematics educators can help students increase their achievement and performance by providing instruction in methods that prove most successful for student learning.

Self-Regulated Learning

Self-regulated learning is a skill educators hope to help students develop because it has an effect on student outcomes – including their achievement, affect, and self-efficacy beliefs. Increasingly, it has become an important construct for educators (Boekaerts, 1999), to ensure that the student takes the responsibility and onus for his or her own learning. Randi and Corno (2000) explain that there are numerous definitions of self-regulated learning, but they acknowledge, "it is commonly agreed that self-regulated learners seek to accomplish academic goals strategically and manage to overcome obstacles using a battery of resources" (p. 651). Pintrich (2000) defines self-regulated learning as "an active, constructive process whereby learners set goals for their learning and then attempt to monitor, regulate and control their cognition, motivation, and behavior, guided and constrained by their goals and the contextual features of the environment" (p. 453).

Students who are self-regulated display meta-cognition, they think about their thinking; they know what they know. Winne (1995) writes, “They (students) are aware of what they know, what they believe, and what the differences between these kinds of information imply for approaching tasks” (p. 173). Among some researchers it is also widely believed that self-regulated learning is both a product within and an outcome of education (Randi & Corno, 2000). A few studies that relate self-regulated learning to student outcomes will be described. Following this, a of review studies that have shown how teachers are able to affect the process of self-regulated learning with their students are presented.

Researchers have shown that self-regulated learning is a skill that can be taught to students. Mason and Shriner (2007) conducted a study with six second through fifth grade students classified with emotional/behavioral disorders. Students were taught self-regulated strategies through instruction with hope of finding that the students would improve their ability to write opinion essays. Students wrote an essay immediately before and immediately after self-regulated strategy development (SRSD). The SRSD involved teaching students POW (Pick my idea, Organize my notes, Write and say more) and TREE (Topic sentence, Reasons – three or more, Ending, Examine) strategies to use when writing an essay. Essays were scored based on four components: number of essay parts, quality of essay, number of words written, and numbers of transition words written. All students received higher scores after the SRSD than prior, demonstrating that SRL improved their ability to write an essay. Mason and Shriner concluded that the study’s results provided evidence that students with emotional/behavioral disorders in their study could be taught how to write a persuasive

essay through self-regulated strategy development. This study shows that self-regulated learning skills can be taught and provides evidence as to how self-regulated strategies positively impact student learning outcomes.

Positive student outcomes have been shown among students who are more self-regulated. For example, students who are more self-regulated are considered to be more effective learners. Research in this area is expanding (Nota, Soresi, & Zimmerman, 2004). Three researchers studied the relationship between self-regulation strategies by a group of Italian students during their last years of high school and their later academic achievement and resilience when pursuing higher education (Nota, Soresi, & Zimmerman, 2004). During the first phase of the study when the students (n=81) were high school seniors, students filled out a brief demographic survey and were interviewed to gauge their self-regulation methods. Each student was given a personalized profile and suggestions for on how to improve their methods. The second phase consisted of determining the number of students (n=49) from phase 1 who continued onto study at a university. The researchers collected the high school diploma grades, number of university exams taken, and grade point averages for the 49 participants during the first two academic years at the university. Only the self-consequences strategy was a significant predictor for high school diploma grades. The strategy of organizing and transforming ("I make an outline before I write my paper,") was a significant predictor for the number of university exams taken and the university grade point average. The amount of variance accounted for by organizing and transforming was sizable for both achievement and resilience measures, a strategy shown to have similar impact in research on younger American students.

Self-regulation strategies have a positive relationship with student outcomes both in their near future (high school diploma grades) and their future educational endeavors (number of university exams taken and university grade point average). Studies such as this one are important to the field of research on self-regulated learning because it provides evidence of the relationship between SRL and student outcomes. Because there is evidence to support this relationship, the next step is to examine self-regulated learning more closely to determine what type of classroom discourse works best and produces the most beneficial student outcomes.

Several studies have looked at the impact of self-regulated learning strategies on students' mathematical achievement. For example, Camahalan (2006) found that self-regulated learning impacts students' achievement in mathematics classrooms. The researcher's hypothesized that low mathematics achievement was related to poor study habits. The intention of the study's intervention was to combat the poor study habits through a program that sought to help students increase their mathematics self-regulated learning, mathematics achievement, and mathematics grade. Sixty students, comprised of fourth and sixth grade students in Southeast Asia, with low mathematics achievement scores and poor study habits participated. The intervention consisted of 30 sessions during six weeks time. Sessions involved instruction focused on developing the students' self-regulation belief system, orienting students to the value of personal responsibility, formally introducing students to Zimmerman's 14 self-regulated learning strategies, explicitly being taught how to write learning goals, and learning how to do self-evaluations. Zimmerman's 14 self-regulated learning strategies include self-evaluation, organizing and transforming, goal-setting and planning, seeking information,

keeping records and monitoring, environmental structuring, self-consequences, rehearsing and memorizing, seeking social assistance (peers, teachers, adults), and reviewing records (re-read tests, notes, textbooks). There were significant differences between treatment and no treatment groups, and between younger and older students for mathematics self-regulated learning.

This study provides additional evidence about the idea that students can be taught to be self-regulated learners and that teachers can affect the development of self-regulated learning strategies in students. Camahalan (2006) writes, “This [study] supports Zimmerman’s theory that when students are given opportunities to self-regulate and explicitly taught to use self-regulated learning strategies, academic achievement is more likely to be positively affected” (p.200). Self-regulated learning strategies can be taught and “likely” positively affect student outcomes – this is noteworthy when considering whether or not teachers should spend time teaching self-regulated learning skills. Another important consideration with this study is that it was conducted with lower achieving mathematics students who possessed poor study habits. Perhaps these are the students most in need of being taught self-regulated learning strategies. Camahalan asserted that it is teachers’ responsibility to teach students how to learn and not merely what to learn.

While the previous study focused on mathematics in general, now look at a study that showed how mathematical problem solving has been related to self-regulated learning. Fuchs, Fuchs, Prentice, Burch, Hamlett, Owen, and Schroeter (2003) conducted a study to examine whether students’ mathematical problem solving is enhanced or not when using self-regulated learning strategies. The researchers had a

sample of 395 third-grade students and 24 third-grade teachers in the 16-week study. They were assigned randomly to one of three groups: control (teacher-designed instruction), transfer (solution plus transfer), or transfer plus SRL. In the third group, transfer plus SRL treatment, SRL components were incorporated by such tasks as allowing the students to score their own problems (with answer key specific to the problem's structure), charting their daily scores, and reporting to the class examples of how they had transferred the unit of study's problem structure to another part of the school day or outside of school. Self-regulation was measured from students by a questionnaire designed by the researchers. One of the overall findings showed that SRL did enhance learning. Fuchs, et al. write, "In sum, instruction designed to increase student behaviors associated with SRL promotes SRL processes as well as learning" (p. 313). Again, these results add to the evidence base that positive outcomes are associated with self-regulated learning behaviors of students.

Teachers can assist in a student's development of self-regulated learning behaviors by tailoring and individualizing their dialogue with a student. Researchers studied graduate students in individual meetings with their course professor for the purpose of looking for changes in scaffolding of self-regulation activities (Hadwin, Wozney, & Pontin, 2005). Ten graduate students participated in the study, all who were enrolled in a six-credit yearlong graduate course on research methods and analysis. The major assignment was to develop a research portfolio concentrating on the areas of research methodology and design, quantitative analysis, and qualitative analysis. Individual meetings were held with the professor at least three times during the course of the year, but the study focused on the first and last meeting the students had with the

professor. Differences between the first and last meetings were an increase in student-directed dialogue, a statistically detectable increase in student-direct regulation, and a statistically detectable increase in dialogue targeting strategy enactment. Hadwin, Wozney, and Pontin (2005) write, “Our findings support…SRL demonstrating a transition from teacher to student regulation of phases and facets of SRL. These ten students appropriated self-regulatory control over time” (p.436).

The professor was instrumental in helping the students develop their self-regulated learning behaviors through the scaffolding during dialogue within their individual meetings. This result is important to this research study because the results contribute to the notion that teachers can help facilitate the development of SRL through discourse. The research study by Hadwin, Wozney, and Pontin differs from this study in that it focused on individual meetings with graduate students. This research will examine what a K-12 teacher is able to do this with many diverse students – different levels, abilities and, learning styles-in one classroom.

Classroom control is usually regarded as a function of the teacher’s behavior, but is also related to students. Self-regulated learning strategies may be more or less adopted by students depending on the control of the classroom. Eshel and Kohavi (2003) hypothesized that students would use more self-regulated learning strategies when student control was higher and teacher control was lower. Conversely, students would use self-regulated learning strategies to a lesser degree when teacher control in the classroom was high and student control was low. An important finding from the study was that student SRL strategies were contingent on the students’ perception of classroom control (Eshel & Kohavi, 2003). “These strategies were highest when

instruction was regarded in terms of student control. A lower level of SRL strategies was found when teacher and student control were perceived to be of about the same magnitude" (Eshel & Kohavi, 2003, p. 258). If teacher control is as high or higher than student control, then the student is not being required or challenged to be self-regulated or employ SRL strategies. This finding is important for the current study because it also shows that the teacher is able to affect the students' use of self-regulated learning strategies.

Classroom Discourse

Classroom discourse provides opportunities for communication of ideas, knowledge, and skills between teachers and students, but it is also a complicated facet of the classroom. Teachers and students may each contribute to the quality of classroom discourse or may inhibit the quality. Researchers have studied classrooms in an attempt to discover the nature of their discourse. It is important to show the nature and influence of classroom discourse and then how it is related to outcomes. A few research studies have provided evidence of the importance of discourse within the classroom and for learning. This discussion will precede a review of several research studies that have linked classroom discourse to student outcomes.

Discourse is an important and complex process, this is comprised of many types of talk and conversation in the classroom – it simply does not fit into one category of dialogue or talk. Dickson (2005) studied an elementary school classroom over a period of six weeks to examine the different types of both student and teacher discourse. She videotaped a fourth-grade classroom at different times of day over a six-week period and randomly chose eight 30-minutes segments to analyze for the study. Dickson defined 18 different types of student discourse and 16 different types of teacher

discourse. The large numbers of categories captured and named by the researchers in this study magnify the complex and multifaceted nature of classroom discourse. Dickson (2005) stated, “the kinds of teacher talk and student talk that were evident seemed to establish a classroom environment that had an emphasis on learning, student choice, independence, and cooperation between teacher and students” (p. 120). This statement acknowledged how classroom discourse can serve as a tool to help students learn not only subject matter, but also academic and social skills.

Classroom discourse provides a means of teaching to a variety of students with diverse learning needs. A classroom that is comprised of students from different backgrounds and cultures will have a vast array of learning needs. For example, White (2003) conducted a study in which she found teachers that used classroom discourse to reach all of their students. She wrote, “They [African American and Hispanic students] need teachers that orchestrate productive classroom discourse to shape the learning environment in a positive way, allowing all children to show that they can learn mathematics and learn from each other” (p. 51). Although the teachers in the study asked questions of students in their classes, questions do not serve as enough of a strategy in itself. White explained that any change in students’ mathematical knowledge and learning is typically made by teachers, who listen to students’ answers, and make changes to their teaching accordingly. “Productive classroom discourse requires that students’ ideas are encouraged, valued, and used to shape instruction” (p. 51).

Classroom discourse provides a medium for exchanging ideas and knowledge between teachers and students. Teachers are not helpful when they fail to listen or make changes to their pedagogy based on the condition of students’ understanding.

Dialogue between the parties involved in classroom discourse provides a tremendous and helpful tool for both teachers and students. Both parties are able to gauge their own understanding, students of the mathematics and teachers of their students, in a quick and immediate feedback system. The implication of this study is that classroom discourse can be used and manipulated for students' instructional benefits. Classroom discourse provides an opportunity for teachers to guide students in their learning and development. Of interest and importance here, is that discourse provides a space for teachers to assist students in becoming self-regulated learners.

Classroom discourse does not exist without the subject matter within which it is embedded and this is an important recognition. Some researchers have studied the connection between the classroom discourse language and the subject matter content. Huang, Normandia, and Greer (2005) conducted a study examining the relationship between the classroom language and mathematical content in a high school class at a private high school. The participants included one teacher participant and 25 students combined from two classes, 12 and 13 respectively. The researchers audiotaped classroom observations, conducted interviews, and collected items such as lesson plans and textbook chapters, which corresponded to the days of observation.

The researchers examined the discourse using theoretical and practical knowledge structures, as defined by their Knowledge Framework paradigm used for the study. Both theory aspects and practical aspects were further broken down into three subcategories. The theory aspect of knowledge structures included classification, principles, and evaluation. The practical aspect of knowledge structures included description, sequence and choice. Researchers found that teachers communicated

using all six subcategories, but students were mostly in the lower level subcategories, which corresponded to the practical aspect of knowledge structures. Teachers would push for higher-level dialogue, but if students failed to participate then teachers would seem to take over. “And very often, when students failed to articulate theoretic aspects of knowledge, the teachers would fall into the trap of taking over the job for them” (Huang, Normandia, & Greer, 2005, p.12). This kind of practice, which routinely occurs, creates a norm where students know they do not have to participate in the higher-level theoretical aspects of knowledge structure because if their silence prevails, then the teachers will take over. These findings may also serve to reinforce students’ beliefs that they have nothing intellectual to contribute to their own learning.

The researchers found a gap between the ways in which the teacher communicated and the ways the students communicated. There has been much discussion about the importance of students communicating in mathematics because it has been linked to understanding and reasoning. As teachers, failing to hear the student articulate the theoretical aspects of knowledge concerning mathematics leaves us to wonder what the student understands. Classroom discourse and language creates opportunities for students to express both higher and lower level aspects of knowledge structures, but has shown to be underutilized. Classroom discourse can be used to help students learn and to communicate regarding the subject matter content on a higher level. It provides a context within which students express and share their understanding of mathematics. Educators do not seize the opportunity for higher level thinking and learning when they allow students to communicate on the lower level of the practical aspects of knowledge structure. Thus, classroom discourse that is not consistently

utilized most effectively to aid students' understanding of mathematics and is not always being used or manipulated as it can be.

Previous studies have contributed to the argument about the importance and nature of classroom discourse. Differences between types of teacher discourse relates to differences in students' reported affect and achievement behaviors. Turner, Meyer, Midgley, and Patrick (2003) studied discourse extensively within classrooms and noted the differences between them. Although their entire study was on nine classrooms, two classrooms were the focus of the study of interest discussed here. Researchers observed and audiotaped each of the two classrooms for the first two days of school and then on ten different occasions. Surveys were administered to students within the two classes. The focus of classroom observations and of student surveys was in the context of mathematics. The two classrooms differed in terms of teacher discourse in that one teacher emphasized understanding more while the other emphasized autonomy. Proportions of total supportive motivational discourse differed, and occurrences of negative or non-supportive motivational discourse differed. Students' surveys showed that students in the classroom which emphasized understanding, had a higher proportion of supportive motivational discourse, and lower non-supportive motivational discourse. They reported more approach behaviors – "conscious acts to improve understanding and achievement" (Turner, Meyer, Midgley, & Patrick, 2003, p. 360) Students in the classroom that emphasized autonomy and had a higher proportion of non-supportive motivational discourse reported more avoidance behaviors and negative effects. These students avoided tasks when they thought they could not perform and made negative appraisals of their ability.

The results of this study are important because they add to the evidence of the effects of teacher discourse on students' outcomes. Although this study did not focus on student outcomes, such as grades, achievement behaviors and affect are equally important student outcomes because they are affected by discourse. Discourse is not as simple as the talking that happens in the classroom from the teacher or the students. It is a complex and important aspect of students' classroom and learning experiences. Discourse has a definite influence on students and thus it is important work to determine what types of discourse influence students most positively.

It is not just what teachers convey through classroom discourse, but how they use classroom discourse that affects student outcomes. Tobin (1986) examined teacher wait time in both mathematics and language arts classes looking for a relationship to student outcomes. His study consisted of 20 sixth and seventh grade classes of which ten were randomly assigned to the control group (maintained regular wait time and received placebo feedback) and ten assigned to a group that received feedback and assistance to maintain a three to five second wait time during a sequence of lessons. Both wait time and teacher discourse were measured from audiotapes of the classes participating in the study. Two measures obtained for the mathematics portion of the analysis included one to gauge formal reasoning ability, Test of Logical Thinking, and a summative achievement measure. Of interest here is that significant differences were found between the control group and the wait time group for mean number of failures (students) to respond and length of student utterances. More importantly, the mean of the summative achievement for the wait time group was higher than the mean for the control group.

Two different types of results were obtained from the study. These results are important and lend themselves to the current study because they reveal that manipulation of classroom discourse, wait time in the preceding study, has an effect on student outcomes. Not only is there a difference in achievement scores. Also, students' participation in classroom discourse is positively changed when they are more active and participative in classroom discourse. Getting students involved in classroom discourse is as important as the teacher using discourse to affect outcomes because of the emphasis and connection on helping students communicate in mathematics classes as it is related to building better understanding. It seems simple that something as easy as wait time can positively affect student outcomes, but the subtle difference is often not seen in classrooms as teachers are quick to move along the discussion and instruction.

Summary

Self-regulated learning is both a process and product for students as well as an essential skill that students need, especially in the domain of mathematics. Students need to possess self-regulated learning skills (product) before they are able to use (process) them effectively and efficiently. Teachers can use classroom discourse to help students develop self-regulated learning skills and behaviors. Discourse is a central part of classrooms in our schools and provides an everlasting medium for teachers to affect student outcomes. Not only is classroom discourse an important and instrumental aspect of classrooms, but it is also one of the five standards defined by the National Council of Teachers of Mathematics that students need to be able to communicate mathematically. More study is needed to determine how teachers use classroom discourse to teach students. Educators want students to communicate mathematically, but they first need to study the ways in which teachers are communicating

mathematically. This study will begin to answer this question as it relates to developing self-regulated learning skills among students in selected secondary mathematics classrooms.

CHAPTER 3
METHODS

This study will seek to determine if there is a relationship between teachers' reported beliefs about self-regulation, teachers' reported practices that facilitate the development of self-regulation, and their observed strategy use for developing self-regulated learners. Furthermore, this study will examine if there are differences between teachers' reported beliefs and practices about self-regulated learning when compared by predominant mathematics subject level, predominant grade level, and the longevity of teachers experience. The purpose of this chapter is to outline the design of the study including the setting, participants, instrumentation, researcher subjectivity statement, data collection, data analysis, reliability, and validity.

The Setting

The population of interest for this study came from high schools located within two large schools districts in the Southeast United States. One school district had nine high schools while the other had 21 high schools. The district with nine high schools earned an 'A' for the school year 2008-2009 while the district with 21 high schools earned a 'B' for the same year. For the purpose of this study, the district with nine high schools is referred to as District A and the district with 21 high schools as District B. Two high schools from District A and one high school from District B were the settings for classroom observations.

The Participants

Prior to conducting any research within the two school districts, the researcher contacted the district office and the department that grants permission for any requests to conduct research. Each district's research office provided an application and required

that a proposal which included the research questions, a review of the literature, intended data collection and analysis, and researcher's credentials be submitted. Both school districts granted permission to conduct research. This approval allowed the researcher to contact the principals at the high schools. The researcher contacted the principals at the high schools in both districts and asked for permission to contact the mathematics teachers within their schools. Not all principals agreed to participate in the study and therefore the researcher was unable to contact the teachers at those schools and ask them to participate in the survey or classroom observations. A total of 7 principals granted permission to contact its teachers for the study.

Participants for the survey were from two different high schools in district A and five different high schools in district B. The total number of participants for the survey included 38 from a list of 72 invited participants for a response rate of 53%. One of the surveys was excluded from the results because the participant indicated that he or she did not agree to participate in the survey. An email asking for volunteers for classroom observations was sent to all of the mathematics teachers at the schools who participated in the survey. The first four teachers who responded to the researcher's request were chosen. The four classroom observation participants came from three different high schools.

All of the four classroom observation participants were female and taught secondary mathematics courses. The four classroom observation participants included: a teacher with her Doctorate degree in curriculum, a National Board certified teacher, an experienced teacher of over twenty years, and a first year teacher. All four teachers were provided with a copy of the research study protocol and informed consent. A gift

card was included as an incentive for those who volunteered to be observed teaching in their classrooms.

Instrumentation

The researcher developed a survey to measure the teachers' reported beliefs about self-regulated learning and reported practices that facilitate the development of self-regulated learning in students. The items of this instrument concentrated on teachers' knowledge, beliefs, and practices about self-regulated learning. The instrument provided an area for the collection of demographic data. The instrument was developed through the use and assistance of an expert panel, cognitive interviews, and pilot testing. Prominent educators and researchers in the field of self-regulated learning were contacted first in order to ascertain whether an instrument measuring teachers' beliefs and practices about self-regulated learning existed. The researcher contacted Dr. Phil Winne (Simon Fraser University), Dr. Deborah Butler (University of British Columbia), Dr. Barry Zimmerman (City University of New York), and Dr. Dale Schunk (University of North Carolina at Greensboro). Each of the four experts stated that they did not know of an instrument of this nature. Dr. Zimmerman explained that he was developing an observational instrument for teachers' classroom behaviors as part of a mathematics intervention, but it would not be appropriate for a classroom without an intervention. Dr. Butler indicated that she thought it would be great to have this type of an instrument. These educators and researchers indicated that no instrument of this type existed therefore suggesting that there was need for a researcher developed survey.

An initial list of items was created by the researcher after reviewing existing survey instruments that focused on self-regulated learning. The researcher examined

the portions of the Motivated Stategies for Learning Questionnaire (MSLQ) and the Learning and Study Strategies Inventory (LASSI) that addressed self-regulated learning. An initial instrument containing 22 items was designed. Cognitive interviews using teachers (N=5) with a mathematics background helped to establish the content validity of the survey items. Additionally, these cognitive interviews served for respondent validation. Their recommendations for re-wording, eliminating and adding questions were used to refine the survey instrument, which included deleting three of the questions from the survey instrument.

Five high school mathematics teachers were invited to participate in the pilot study of the instrument. They completed a hard copy version of the survey. These teachers were not included in the actual study. Correlational analyses were conducted looking for items with low correlations, but no items were removed because of this criteria. Cronbach's alpha for the pilot study was .645 for the 19 items.

The beliefs subscale of the survey consisted of seven items while the practices subscale consisted of twelve items. Participants rated the items using a five-point Likert scale. They rated the practices items on a continuum of frequency with which they used or modeled SRL techniques and they rated the beliefs items on the extent to which they agree. In addition, demographic data including: gender, predominant grade level taught, predominant mathematics subject course taught, and number of years of teaching experience were collected from the survey. A copy of the survey instrument, including the Likert scales, can be found in Appendix A.

Researcher Subjectivity Statement

The researcher spent the past four years as a full-time graduate student and worked as a research assistant with a professor. Prior to beginning the doctoral

program, she taught secondary mathematics for four years in Marion County, Florida. She participated in professional development opportunities beyond the requirements of her teaching position and sought out methods to help her students.

Maintaining subjectivity is part of the process of qualitative data (Glesne, 2006) and any researcher must strive to maintain an objective view. The researcher for this study had extensive training and experience in collecting qualitative data for the previous four years. This training has served as a guide for her qualitative data collection techniques.

Data Collection

Data collection occurred during the Spring semester of 2009. The survey was administered using an internet survey service provider. An initial email was sent to the population of interest explaining the survey, its purpose, and indicating when the survey itself would be received by participants. Two days following the initial email, a second email was sent with an invitation and link to participate in the survey. Two reminder emails were sent to individuals who had not yet responded to the survey. The entire data collection phase for the survey lasted 18 days. An incentive of a gift card was given to one survey respondent randomly chosen from among those who participated.

Classroom observations also occurred during the Spring semester of 2009. The researcher communicated with the participants through email and obtained a classroom schedule and school calendar schedule. Participants indicated days, times, and classes in which they would be available for observations. The researcher notified teachers when she would be visiting their classrooms. Schools required the researcher to sign in at the front office for each visit. Each of the four participating teachers was observed for approximately five to six hours of class time for a combined total of 22 hours. The

classroom observation protocol was a computer-generated template to record a running account of everything communicated and performed by the teachers during their interactions with the students within the classroom during the observation timeframe. A copy of the observation protocol is included as Appendix B.

Data Analysis

Classroom Observations

Classroom observations were analyzed according to Spradley (1980) domain analysis methodology. Field notes from classroom observations were open coded. Open coding is appropriate for qualitative research as it allows themes to emerge from the data without any preconceived assumptions or ideas (Patton, 2001). Connections between the open codes were then established and grouped into tree nodes according to the research questions. This process resulted in tree nodes, “categories of meaning…that represented the data” (Patton 2001, p. 584). Using these tree nodes, the author looked for cross coding and a richer understanding of the connections between and within the participants. Conceptual definitions were developed to support the tree nodes and are described along with each theme.

Survey

Survey data were analyzed using SPSS 17.0. An analysis of covariance (ANCOVA) was conducted to determine if there was any significant differences in teachers’ beliefs or teachers’ practices when compared by gender, grade level taught, number of years teaching experience, or course level taught. The full model was used for the ANCOVA analysis with three factors of two levels, and one continuous variable. Lastly, a correlation was run to check for any relationship between teachers’ reported beliefs and teachers’ reported practices in relation to self-regulated learning.

Thirty-seven individuals responded to the survey instrument. Demographic data for the 37 respondents included 26 females and 11 males. Twenty-two of the respondents taught underclassmen, students in ninth and tenth grades, while 15 taught upperclassmen, students in eleventh and twelfth grades. Fourteen respondents taught advanced classes, which was defined as any course designated as an honors course or any course beyond algebra 2. Twenty-three taught basic courses – algebra 1, geometry, algebra 2, and liberal arts math. The number of years teaching experience ranged from zero years to 37 years (M=12.47, SD=10.91). Demographic data for the survey respondents can be found in table 3-1. Additionally, tables 3.2 and 3.3 provide descriptive statistics for teachers' beliefs and teachers' practices.

An analysis of covariance was run for both teachers' beliefs and teachers' practices. The full model was used for each, which included gender, grade level taught, number of years teaching experience, and course level taught as covariates. For this study, the grade level taught was categorized as follows. Ninth and tenth graders comprised group one, while eleventh and twelfth graders comprised group two. The rationale was that eleventh and twelfth graders are commonly defined as upperclassmen while ninth and tenth graders are defined as underclassmen. While high school mathematics teachers do not generally teach one specific grade level, typically they solely teach upperclassmen or underclassmen. Those respondents who chose three or more grade levels were included in the group where the majority of their students were classified. Also, course level taught was defined as teachers of basic courses and teachers of advanced courses. Teachers of basic courses included those who teach algebra, geometry, algebra 2, and liberal arts math. Teachers of advanced

courses included those who teach honors courses and those who teach courses beyond algebra 2.

Comparing Classroom Observations and Survey Results

Classroom observations and survey results were compared to determine if teachers' reported practices about self-regulated learning were evident in classroom teaching. In essence, classroom observations provided evidence to either confirm or refute the survey results about practices.

Reliability and Validity

Classroom Observations

Several steps were taken to establish trustworthiness of this study through its design and implementation. First, the researcher spent an extensive and persistent amount of time in classrooms for observations. The extensive amount of time immersed in the classrooms allowed the researcher to "develop trust, learn the culture, and check out [your] hunches" (Glesne, 2006, p. 37). The researcher spent a combined total of 22 hours in the field within classrooms conducting observations. She observed each participant on three to five occasions for a total of five to six hours in each classroom. Repeated visits to classrooms allowed for multiple observations, which allowed opportunities to notice similarities and differences within the data.

A second procedure employed to promote trustworthiness was a "clarification of researcher bias – reflection upon your own subjectivity and how you will use and monitor it in your research" (Glesne, 2006, p. 37). The researcher examined her own bias and described for the reader, which is included in this study. A third technique involved providing a "rich, thick description" throughout the data (Glesne, 2006, p.37).

The researcher recorded field notes and wrote them with a thorough description of all communications and actions within the classroom for both the teacher and students.

An additional step to increase the validity of the classroom observations included peer auditing. A fellow graduate student completed a review of 25% of the classroom observation fieldnotes. She concurred that the themes that emerged were appropriate.

Survey

Reliability measures for the two sections of the survey were moderately strong. The Practices subscale of the survey consisted of 12 Likert scale items with Cronbach's alpha of .756. The Beliefs subscale consisted of seven Likert scale items with a Cronbach's alpha of .815. The Cronbach's alpha based on standardized items for Practices and Beliefs were .800 and .825 respectively. Evidence of content validity for the survey was provided through cognitive interviews and expert feedback in the construction of the instrument.

Table 3-1. Demographic Data of Survey Respondents

Factor	Frequency	M	SD
female	26		
male	11		
teaching underclassmen	22		
teaching upperclassmen	15		
teaching basic courses	23		
teaching advanced courses	14		
years teaching experience		12.47	10.91

Table 3-2. Descriptive Statistics: Beliefs

Gender	grade level taught	course taught	M	SD	N
female	9th-10th	basic	11.33	2.78	9
		advanced	12.00	3.64	9
	11th-12th	basic	9.00	2.10	6
		advanced	11.00	4.24	2
male	9th-10th	basic	11.67	4.62	3
		advanced	10.00	.	1
	11th-12th	basic	12.20	3.77	5
		advanced	17.00	4.24	2

Table 3-3. Descriptive Statistics: Practices

Gender	grade level taught	course taught	M	SD	N
female	9th-10th	basic	23.22	4.35	9
		advanced	24.22	9.02	9
	11th-12th	basic	18.83	4.79	6
		advanced	19.50	2.12	2
male	9th-10th	basic	26.33	4.04	3
		advanced	26.00	.	1
	11th-12th	basic	32.40	7.44	5
		advanced	21.50	2.12	2

CHAPTER 4
RESULTS

The findings in this study were analyzed to determine any differences in teachers' reported beliefs and practices when analyzed by grade level, mathematics subject taught, gender, and number of years teaching experience. Both qualitative and quantitative methods were employed to analyze data. The purpose of this chapter is to present the findings as they relate to each research question.

Research Question 1) What Themes Emerged from Teacher Observations?

Thematic analysis of classroom observations resulted in the identification of five emergent themes: student as teacher, teacher questioning, teacher emphasis on note-taking, individualized help, and students helping students.

Classroom Observations

Student as teacher

Student as teacher is defined as activities that the student conducted by him or herself in the role of the teacher. Two of the four classrooms relied heavily on this activity; one classroom used it completely for the duration of classroom observations. In the second classroom that relied heavily on this instructional practice, individual students taught a lesson to the class following the same instructional format as the classroom teacher. This task was an assigned project. Students had signed up previously for the topic of their teaching presentation in addition to the date they would be teaching. The teacher provided me with a copy of the rubric that she had given students to guide them when designing their lesson. Students as teachers gave students practice problems to check for their understanding, called on students to work out problems on the white board, assisted individual students with questions, and gave

an assignment that students had to complete for a grade. In addition, the student as teacher had to provide an answer key to the teacher for the assignment given to the class. An example of student as teacher teaching follows: A female *'teacher' asked if anyone needed more time to work. One female student asked if they could go step-by-step for solving the problems and the teacher said yes. First, she wrote the quadratic equation on the board and asked students what they needed to do first. Another female student explained that they needed to figure out what a, b, and c are and the teacher agreed. She asked students and wrote down the answers to the values of a, b, and c. She then asked a student if she wanted to come to the board to work it out and the student agreed. Students sat quietly and talked a little while the student solved the problem on the board. The student worked as far as she could and then said, "I'm stuck." The teacher helped the female student finish solving the problem.* The student as teacher assisted students as a whole class and individually when she gave them their assignment after completing the board work.

A second classroom also employed students as teachers, but students did not teach individually. In this classroom, students were assigned to work in groups of two to three students to present a lesson and review a particular topic from the semester for the final exam. Students taught the topic to the class, asked if their peers had questions, and a few of the groups provided practice problems for the students to complete. Similarly to the first classroom, students had signed up ahead of time and knew the topic and date of their presentation. The teacher reminded the students often that their presentation counted as a test grade. While students were teaching, often the classroom was exceptionally loud and disruptive. Occasional disruptions were caused

by a student arguing with the teacher. For example, one male student was talking throughout a presentation and the teacher told him to stop, but he argued with her and stated that he did not have to do what she told him to do. The teacher said, “We are not going to do this today,” but he kept arguing. The teacher then took the male student into the hallway to speak with him. Another time, the teacher called the discipline office to have a male student who was arguing with her removed from the classroom. Following is a scenario from the second classroom: A group of three male students wrote a problem on the board and said, *“Simplifying rational expressions.” One student began working out the problem telling students what he was doing for each step. The teacher stopped the male student in the middle of solving the problem and told the group that she knew two of the students in the group liked to do things in their heads. She went to the board and rewrote the problem explaining to the group that they were doing things differently than most of the students in the class could do. She told them that most of the students couldn’t do it in their heads like they could and wanted them to work out every aspect of solving the problem for the students in the class.* The teacher allowed the student teachers to teach the lessons, but she made sure that they presented the material in a way for the students in class to comprehend.

Teacher questioning

Teacher questioning is defined as all questions directed from the teacher to students. Teacher questioning was evident in all four classrooms, but not all four teachers used questioning in the same manner. While one teacher would question students and ask them to explain how they came up with an answer, another teacher merely asked students what their answer was. One teacher used questions frequently throughout her lessons by asking students questions as they worked out problems

together. As she worked out an algebra problem on the board, she did not remind students what to do for each step, instead she asked students what the next step of the problem was until the problem was completed and solved. Additionally, she questioned students until they came up with proper terminology that she was looking for while discussing problems with them. For example, she asked questions about multiplying monomials and what had to be done to solve these types of problems. She prompted students until someone said, “distributive” and then asked what they did after they multiplied a monomial by a binomial. She then reminded students about the types of problems they had done leading up to today. She used scaffolding while questioning students by leading and building students towards the day’s work and problems.

Teacher questioning can be highly productive towards creating student self-regulation when teachers hold students accountable for providing explanations and justifications for their work. Teachers often made students explain how they solved a problem.

Teacher emphasis on note-taking

Teacher emphasis on note-taking is defined as simply teacher- talk and ways in which the teacher emphasized the activity of writing down notes that describe the process of problem solving to her students. Two of the four teachers emphasized note-taking with their classes. One teacher introduced a new topic with a lecture from a curriculum package offered through the school district. The teacher used a video that played on the projector that she had the ability to pause as needed. She often paused the video and told students to copy notes from the screen. She told students exactly what to write down and told them that their notes needed to look exactly like her notes. She also reminded students that they would be turning in their notes for a grade. The

teacher also told students when a particular concept was important and instructed them to put a asterik next to it so they would know it was important. The teacher *paused the video and told students to put asterisks next to the definitions and formulas for the special products. She also said that she would be looking for these asterisks when checking their notes.*

The teacher *explained to students why information about special products was important. She explained that it would save them time when they saw (x+a)(x-a) patterns. She asked students if they should copy the examples of problems that the video presented and then told students, "Yes, probably because I stopped the screen."*

A second teacher emphasized note-taking with her students, but did not explain to students what they should be taking notes about or what to write. *She said that the students who didn't write this stuff down wouldn't remember it for tomorrow.* Students were reviewing for a test that they would be taking the next day, but several students were unaware of the upcoming test. *She told the class that this was their review for the test and to write it down.* She did pause to give students time to take notes and write down information, but then continued by presenting more problems for review.

Individualized help

Individualized help is any time the teacher worked with a student one-on-one, or a small group of students, to direct her instruction and guidance towards the students' learning needs. All four of the teachers provided individualized help for students. Most often this occurred as the teacher was walking around the classroom looking at students' work. Teachers often stopped to talk to a student about their work and provided individualized help for the student based on their conversation together. Occasionally, the teacher would be sitting at her desk and students would go to the

desk to ask the teacher a question about the assignment. This also allowed the teacher to work one-on-one with the student as well. *Students were quietly working and one male student raised his hand after a few minutes of working. The teacher told students to come to her desk if they needed.* Another teacher helped students as she walked around the classroom checking on students' work. *The teacher sat down with a group of two male students to help them with the problems on the worksheet. When she finished helping them, she went to a student who was calling to her for help. The teacher continued assisting students with problems on the assignment. She told one student to set up the equation (quadratic formula) and then she would be back.*

One teacher provided individualized help to an English as a Second Language student and spoke in Spanish to him. She did this as she walked around the classroom speaking to individual students. She did not teach and then repeat everything in Spanish to this male student. The student was capable of communicating in English, but she spoke in his primary language when working with him individually.

Students helping students

Students helping students is any form of help or assistance given from one student to one or more fellow students. Students were occasionally observed assisting fellow students with questions and working out math problems. In one class, students were acting as teachers and presenting lessons that were reviews of different topics throughout the course because of the upcoming final exam. One group of students was teaching and working out example problems when a student in the class asked for more detailed instruction. *The male students began working out the next problem on the board and a female student in class asked that they explain what they are doing while they worked out the problem. The directions for the problem said to use -1 for x. One*

female student asked where the -1 came from. Another male student questioned where all of the numbers on the board were coming from. He wanted the student working out the problem on the board to show all of the steps to solve the problem so he could see where the numbers were coming from.

Students assisted each other when asked for help. Occasionally, students worked out problems on the board for the class. Students sometimes volunteered to work out the problems, but sometimes were chosen to do so by the teacher or student teacher. If necessary, the students were given help to finish and correctly solve the problem on the board. *Students sat quietly and talked a little while the female student solved the problem on the board. The student worked as far as she could and then said, "I'm stuck." Another female student, the student acting as teacher, helped the student finish solving the problem.* Students helped other students when needed.

Research Question 2) How Do Teachers Support Self-regulated Learning Use in Mathematics Classes During Instruction?

The means of teacher beliefs and teacher practices scores on the survey were 1.645 and 2.01, respectively. The mean scores for beliefs ranged from 1.00 to 2.86. The mean scores for practices ranged from 1.08 to 3.75. The standard deviations were .494 and .585, respectively.

The beliefs mean score of 1.645 is between completely agree and somewhat agree. The practices mean score of 2.01 is slightly over 'weekly' for how often a teacher reported suggesting or modeling practices to facilitate the development self-regulated learning behaviors in students. Table 4-1 includes descriptive statistics for each individual item on the survey. The table shows the items, corresponding Likert scales for the items on both the practices and beliefs portions of the survey, mean, and mode for

each item. This table presents which items respondents reported doing more often for the practices component of the survey and the degree to which respondents agreed with items addressing beliefs about self-regulated learning. The mean provides the overall average for the item among all respondents while the mode tells which rating on the scale was chosen most often by each item.

Beliefs

The items with the three lowest means for all respondents included “Self-regulated students recognize when they have questions about their work,” (M=1.32), “Self-regulated students participate in goal planning more than students who are not self-regulated,” (M=1.46), and “Self-regulated students are aware of their learning environment,” (M=1.49). A response of one for these items indicated “completely agree” while a two was “somewhat agree.” The items listed had means less than 1.5 indicating that respondents most closely completely agreed with the statements.

The items with the highest means for all respondents included “Self-regulated students are able to monitor their interactions while learning” (M=2.00) and “Self-regulated students know what they need to do to reach their goals” (M=1.89). Again, because a score of one was indicative of “completely agree” and two was “somewhat agree,” it is evident that respondents only somewhat agreed with these statements.

Practices

The items with the lowest means for all respondents included, “I ask students questions that help students become self-regulated learners,” (M=1.14), “I encourage my students to become self-regulated learners,” (M=1.27), and “I model behaviors that help my students become self-regulated learners” (M=1.28). A score of one on these items indicated that the teacher model or suggested this practice daily, while a score of

two indicated that the teacher model or suggested the behavior weekly. The mean scores were closer to one than two, which represents practices and behaviors that the teacher modeled or suggested closer to daily than weekly.

The items with the highest means for all respondents included, “Students skim new course material, before studying it, to see how it is organized,” (M=3.19), “Students change the way they study in order to fit the teacher’s teaching style,” (M=3.19) and “Students sort out their notes after class if they get confused while taking notes during class” (M=2.68). A score of three on these items represented behaviors or practices that the teacher model or suggested monthly while a score of two represented behaviors and practices modeled or suggested weekly by the teacher.

From the emergent themes that have been defined and described for the first research question, those that can be considered as supporting self-regulated learning use in mathematics classes during instruction include teacher questioning and students helping students.

Teacher questioning supported the development of self-regulated learners if used to support student understanding. For example, asking the student for the answer to a question without any type of explanation from the student does not promote self-regulation. However, when the teacher asked for the answer and required the student to explain how he or she arrived at the answer or reasoning for completing the problem as he or she did, then this promoted self-regulation.

Students helping students is another theme that promoted self-regulation when students asked other students to show and explain how to work out a problem. Teachers promoted the development of self-regulation by allowing students to help

each other through questioning and providing explanations to fellow students. Self-regulation was observed when students knew where to go for help and how to ask for help when needed. Instances when a student simply asked another student to give him or her the answer to a problem do not promote self-regulation.

Research Question 3) What are the Differences between Teachers' Reported Beliefs and Practices about Self-regulated Learning when Compared by Grade Level Taught?

Beliefs

The analysis of covariance (ANCOVA) was conducted using the full model – three factors with two levels and one continuous variable. The three factors were gender, grade level taught, and course level taught. The continuous variable was the number of years teaching experience. The full model was used to examine any possible main effects and any possible interactions. When using the full model for analyzing teachers' reported beliefs, Levene's test for Equality was .692, indicating that there was no violation of equal variances.

There was no significant difference in teachers' reported beliefs when compared by grade level taught (F=1.96, p=.176). There was a significant interaction between grade level taught and number of years teaching experience for beliefs, (F=6.395, p=.019). To understand the interaction, Figure 4.1 was constructed by creating cutpoints for teaching experience through SPSS by designating a need for four intervals of approximate equal percentile. Teachers' reported beliefs follow the same trend for teachers of both under and upperclassmen for teachers with three to twenty-two years of teaching experience. Teachers reported beliefs increase from three to nine years of teaching experience, decrease slightly between nine and twenty-two years of teaching experience and increase after twenty-two years of teaching experience. However, the

increased reported beliefs is significantly different for teachers of underclassmen and for teachers of upperclassmen. Figure 4.1 provides a graph showing this significant relationship.

Practices

ANCOVA results showed no significant relationships between teachers' reported practices and grade level taught, even with controlling for gender, number of years teaching experience, and course level taught. Analyzing teachers' reported practices yielded Levene's test for Equality of .095, indicating the assumption of equal variances was not violated. F-values and p-values are included in Table 4.3 at the end of this chapter. This table includes data for all main effects and interactions for practices.

Research Question 4) To What Extent Do Teachers' Numbers of Years Teaching Experience Explain the Variation in Teachers' Reported Beliefs and Practices about Self-regulated Learning?

Teachers' numbers of years teaching experience was collected in the demographic portion of the survey instrument. In response to an open-ended question, teachers were able to identify explicitly the numbers of years that they has taught. The researcher conducted an ANCOVA analysis to identify if there was relationship between the number of years teaching experience and teachers' reported beliefs and reported practices about self-regulated learning. The scores for the practices and beliefs measurements were calculated as a total of the individual item Likert ratings.

Practices

The mean number of years of teaching experience was 12.473 (n=37, SD = 10.914) with a minimum of zero years and a maximum of 37 years. The mean for practices was 24.062 (SD = 7.026).

There were no significant main effects and no significant interactions. Table 4.3 provides data for all of the main effects and interactions for practices.

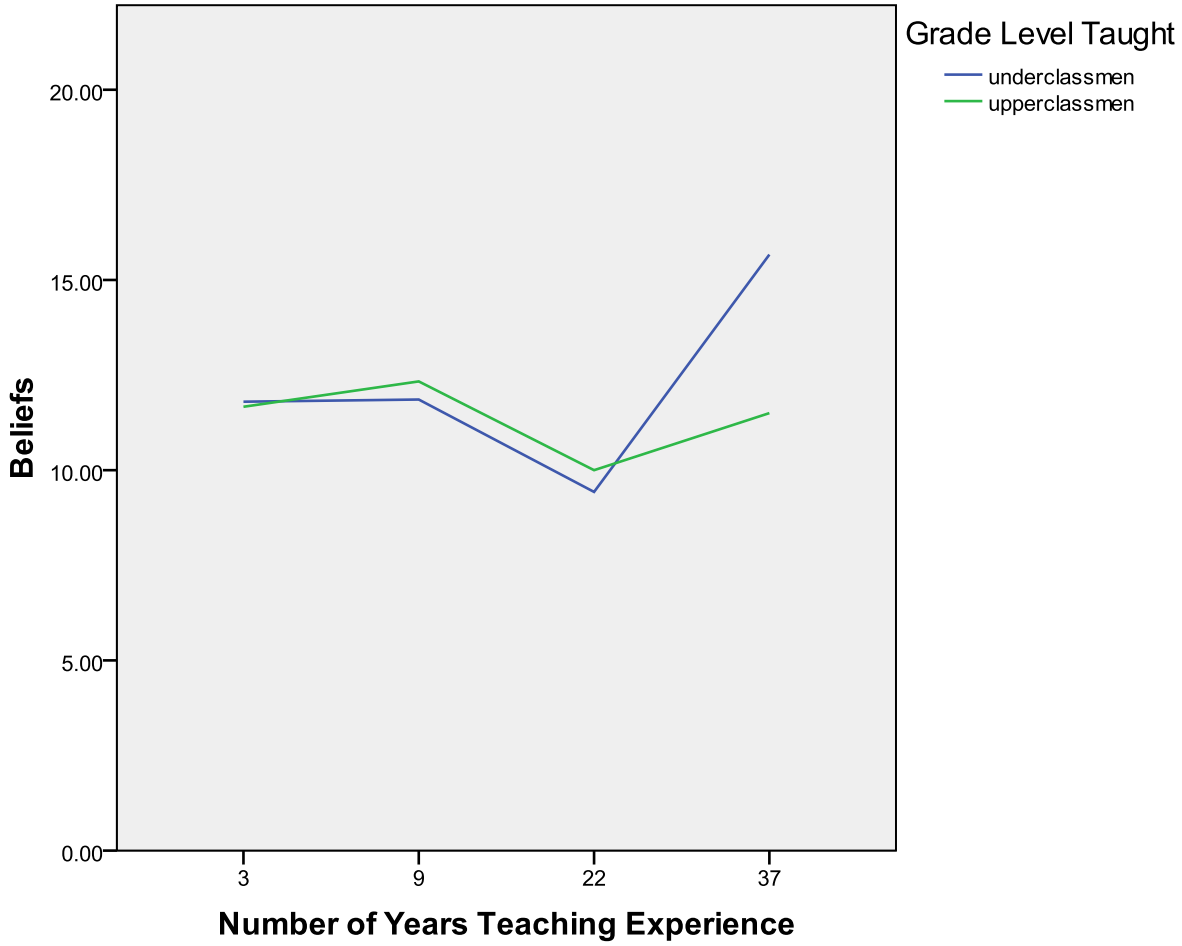

Figure 4-1. Graph of Beliefs x Teaching Experience x Grade Level Taught

Beliefs

The mean for beliefs was 11.514 (SD = 3.461). There was a significant main effect for years of experience teaching (*F*=4.818) with p=.039. There was a significant interaction effect between number of years and grade level taught on beliefs (*F*=6.395) with a p=.019. Figure 4.1 shows this relationship. Table 4.2 provides data for all of the main effects and interactions for beliefs.

Research Question 5) What is the Relationship between Teachers' Reported Beliefs and Teachers' Reported Practices about Self-regulated Learning?

An analysis of the survey results showed that there was no significant correlation between the mean scores of teacher's reported beliefs about self-regulated learning and the mean scores of teacher' reported practices. The mean for practices was 2.005 (SD = .585). The mean for beliefs was 1.644 (SD =.494). The Pearson correlation value was .073 with a p-value of .667, which is not significant, when analyzing the means of beliefs and practices. Tables 4-4 and 4-5 also provide this information.

Table 4-1. Survey Items with Descriptive Statistics

Self-regulated Teaching Practices and Item Number	Mean	SD
How often do you suggest or model the following behaviors to your students? 1=daily, 2=weekly, 3=monthly, 4=yearly, 5=never		
2. Students sort out their notes after class if they get confused while taking notes during class.	2.68	1.47
3. Students try to figure out what they are confused about.	1.35	.753
4. Students skim new course material, before studying it, to see how it is organized.	3.19	1.37
5. Students ask themselves questions to make sure they understand the material they have been studying in class.	2.11	1.43
6. Students change the way they study in order to fit the teacher's teaching style.	3.19	1.63
7. Students try to decide what they are supposed to learn rather than just reading it over when studying.	2.05	1.31
8. Students decide which topics they don't understand well when studying for the course.	1.78	1.00
9. Students set goals for themselves when studying for a class.	2.51	1.17
17. I assign tasks that help students become self-regulated learners.	1.51	.84
18. I ask questions that help students become self-regulated learners.	1.14	.42
19. I model behaviors that help my students become self-regulated learners.	1.28	.77
20. I encourage my students to become self-regulated learners.	1.27	.51
Self-regulated Teaching Beliefs and Item Number		
To what extent do you agree or disagree with the following statements?		
1=completely agree, 2=somewhat agree, 3=neither agree nor disagree, 4=somewhat disagree, 5=completely disagree		
10. Self-regulated students participate in goal planning more than students who are not self-regulated.	1.46	.61
11. Self-regulated students recognize when they have questions about their work.	1.32	.48
12. Self-regulated students are able to determine what help they need during assignments.	1.59	.64
13. Self-regulated students know what they need to do to reach their goals.	1.89	.74
14. Self-regulated students reflect on their schoolwork.	1.76	.90
15. Self-regulated students are able to monitor their interactions while learning.	2.00	1.00
16. Self-regulated students are aware of their classroom learning environment. (16)	1.49	1.51

Table 4-2. Tests of Between-Subjects Effects: Beliefs

Source	F	Sig.
Gender	.266	.611
grade level	1.959	.176
course level	.366	.551
years exp	4.818	.039*
gender * course level	1.077	.311
grade level * course level	.320	.577
course level * years exp	.136	.716
gender * grade level	.109	.745
gender * years exp	3.993	.058
grade level * years exp	6.395	.019*
gender * grade level * course level	.	.
gender * course level * years exp	2.754	.111
grade level * course level* years exp	.326	.574
gender * grade level * years exp	.020	.888
gender * grade level * course level * years exp	.	.

* Denotes significant at p≤ .05

Table 4-3. Tests of Between-Subjects Effects: Practices

Source	F	Sig.
Gender	.919	.348
grade level	.104	.750
course taught	.453	.508
years exp	.587	.452
gender * course level	.072	.791
grade level * course level	1.155	.294
course level * years exp	.025	.876
gender * grade level	1.295	.267
gender * years exp	.050	.826
grade level * years exp	.043	.838
gender * grade level * course taught	.	.
gender * course level* years exp	.230	.636
gradelevel * course level * years exp	1.952	.176
gender * grade level * years exp	.027	.872
gender * grade level * course level * years exp	.	.

Table 4-4. Correlation Analysis – Descriptive Statistics

	M	SD	N
Practices	2.005	.586	37
Beliefs	1.654	.494	37

Table 4-5. Correlations

	Pearson Correlation	practices	Beliefs
Practices	Sig. (2-tailed)	1	.073
	N		.667
	Pearson Correlation	37	37

CHAPTER 5
DISCUSSION

The purpose of this study was to examine the relationship between secondary mathematics teachers' reported beliefs and practices about self-regulated learning and observed classroom teaching, and any relationships in reported beliefs and practices when compared by grade level, number of years teaching experience, and between reported beliefs and reported practices. The purpose of this chapter is to summarize these findings, describe the implications of this study, and provide suggestions for further study.

Summary of the Findings

While many educational researchers have written about self-regulation and its benefits, what is not known are teachers' reported beliefs and practices for self-regulated learning (Boekaerts, 1997; Fuchs, Fuchs, Prentice, Burch, Hamlett, Owen, & Schroeter, 2003; Mason & Shriner, 2007; Schunk & Zimmerman, 1998; Winne, 1995; Zimmerman & Schunk, 2001). This study was conceived with the need to answer the following research questions: What is the relationship between teachers' beliefs and practices about self-regulated learning and teachers' observed self-regulated strategy use? How do teachers support self-regulated learning use in mathematics classes during instruction? What are the differences between teachers' reported beliefs and practices about self-regulated learning when compared by grade level taught? To what extent do teachers' numbers of years of teaching experience explain the variation in teachers' reported beliefs and practices about self-regulated learning? What is the relationship between teachers' reported beliefs and teachers' reported practices about

self-regulated learning? In order to answer these questions, teachers completed a survey and four teachers were observed during mathematics instruction.

Classroom Observations

Classroom observations resulted in the emergence of five themes. These themes included: student as teacher, teacher questioning, teacher emphasis on note-taking, individualized help, and students helping students. Each theme is briefly reviewed again for the purpose of discussion.

Student as teacher

Students performed and conducted class as if they were the teacher. Two classrooms employed this scenario extensively by assigning classroom projects requiring students to teach the class. In one of the two classes, the teacher provided a rubric that explained to students what was required of them, including giving the class an assignment to complete. The second classroom had students working in small groups to review a topic for the class for the final exam. The groups of students taught the topic and provided example problems.

Teacher questioning

Teachers questioned students during both whole group and individual instruction. Two teachers used questioning to scaffold students' learning by guiding them to the correct answer while two teachers simply asked students questions that only required them to provide the correct answer for a problem. Teachers can use questions in a manner which allows the student to arrive at the solution on their own. They may also use questioning to facilitate students becoming self-regulated learners by requiring them to explain and describe how they arrived at their answers. The important idea is that

teachers can use questioning in more than one way and can require as much or as little effort from students in their answers.

Teacher emphasis on note-taking

Teachers told students to take notes and when to refer back to their notes. One teacher taught new concepts and required her students to take notes even going so far as to tell students exactly what to write down. Through this method, she made certain that students had the necessary notes to help them complete their assignment. A second teacher told her students it was important to take notes while they were reviewing for a chapter test the next day. She reminded them frequently that it was a good idea to take notes, but offered no further instructions or guidance about how they should be taking notes or what notes to take.

Individualized help

Teachers offered help to individuals as needed during both whole group instruction and when walking around the classroom to monitor student understanding. All four teachers paused during whole class instruction to help individual students if needed. Likewise, all four teachers helped individuals as they worked on assignments at their desks.

Students helping students

Students were often observed as they worked with other students and helped them with concepts, assignments, and questions. Students who were teachers would help the class by answering students' questions. Additionally, students would ask questions within the classroom, sometimes directed at the teacher and sometimes directed at no one, while another student would help by answering the question or guiding them to the correct answer.

Survey Data

Statistical analyses were conducted to determine if there were relationships between teachers reported beliefs about self-regulated learning and the grade level taught, teacher reported practices about self-regulated learning and grade level taught; the number of years teachers had taught and their: (a) reported beliefs about self-regulated learning and (b) reported practices about self-regulated learning; and teachers' reported beliefs and practices about self-regulated learning. An analysis of covariance and correlational analysis were conducted to determine if there was any statistical significance. Survey data results are briefly reviewed for the purpose of discussion.

There was a significant main effect for beliefs with number of years teaching experience. There was also a significant interaction between number of years teaching experience with grade level taught for beliefs. There were no significant main effects of interactions for teachers' reported practices. There was no significant relationship between reported beliefs and reported practices.

Disagreement Between Observations and Survey Results

Just as important as what was observed in classrooms for this study is what was not observed. Survey results indicated that teachers are facilitating the development of self-regulation within their students daily to weekly for nine of the twelve items for this construct on the survey. Item 20 stated, "I encourage my students to become self-regulated learners." The mean score for this item was 1.27 indicating a close proximity to performing this task daily. This was not observed at anytime within the 22 hours of classroom observations. Another item asked teacher how often they model or suggest that students try to figure out what they are confused about. This also was not observed

during this study. Teachers may think that they are modeling or suggesting to students tasks that help them develop into self-regulated learners, but they were not observed to be doing so. There was an incongruence between the survey results and classroom observations. There was no evidence in the classroom observations to support the reported the frequency of those practices or they extent to which teachers reported believing that particular techniques would help students develop into self-regulated learners.

Limitations

An inherent limitation of qualitative research is small sample size and this is also evident in this study. The time and labor of conducting qualitative research make it difficult to have a large sample size. The four classroom observations is evidence of the small sample size issue in qualitative research. Additionally, qualitative research is temporal and represents this one particular time. These results are not representative of instruction across the school year as they are a snapshot in time. They are not generalizable.

Implications

Self-regulation is a skill that benefits students who set their own goals, seek out help when needed, control their learning environment, and reflect on their work (Boekaerts, 1997; Schunk & Zimmerman, 1998; Winne, 1995; Zimmerman & Schunk, 2001). While the focus of this study is secondary mathematics classes, self-regulated learning is a skill that students can use throughout the entire spectrum of their classes and schools at all levels. Some students will develop this skill on their own while others will need help from educators who can explicitly teach this skill set to them. This study is important because it brings attention to what teachers are or are not doing in relation to

developing this particular group of secondary mathematics students into self-regulated learners during their instructional practices.

While the teachers in this study reported in the survey that they practice ways to facilitate the development of self-regulation, classroom observations did not provide evidence to support those results. There is a disconnection between teachers' beliefs and practices. This lack of consistency could be due to several factors, but I believe it is because the nature of classroom management often takes over as the prominent task in the classroom and teachers fail to do what they intended to do. More opportunities for developing classroom management skills will make this task easier and more efficient so that teachers can focus on the important and necessary tasks, such as developing students into self-regulated learners. Experienced educators may need professional development to help them with current classroom management while novice teachers could benefit from more than what is learned from a textbook in college courses.

This study adds to the field because an original instrument was created. The instrument, although in its early stages of development, can be further tested and modified by other educational researchers to develop it into a stronger measure of teachers' beliefs and instructional practices of self-regulated learning. It has the potential to be a powerful tool because of the data it provides researchers about teachers' beliefs and practices. Self-regulated learning is an important skill that students need to develop. The first place to begin this task is to find out what teachers believe about SRL and what they are doing to develop this skill within their students.

It is important to know what teachers believe about self-regulated learning because it provides a baseline of information from which professional development

initiatives can be developed that are aimed at teaching them about the benefits of SRL. On all of the items related to beliefs, the mean score ranged from 1.32 to 2.00 indicating that teachers' ratings on those items ranged from completely agreed to somewhat agreed. These particular items were representative of benefits of self-regulated learning for students. This result is important because it suggests that teachers believe in the benefits of SRL. Teachers are more likely to promote and encourage a concept or skill when they believe it has benefits (Pajares, 1992). If teachers value the worth of self-regulation and believe in its benefits, it might be easier to get them to use those instructional practices in their classrooms to facilitate the development of self-regulation within their students.

The statistical analyses in this study indicated that there were not significant differences in teachers' reported beliefs and practices related to self-regulation when compared by grade level or the number of years of experience among the teachers. This finding implies that teachers of all grade levels need direction with the concept of self-regulation. Additionally, teachers of all experience levels (number of years teaching experience) need guidance with how to incorporate those practices into their instruction that facilitate students' development of self-regulated behaviors.

Researchers have shown that what a teacher knows about content in addition to pedagogy has a positive impact on student learning gains (Ma & Papanastasiou, 2007; Monk, 1994; Swafford, Jones, & Thornton, 1997). Research has also shown that how a teacher teaches – talking to the student about the topic versus solving an example problem – positively affects student achievement. The implications of the findings from this study in relation to previous studies is that building the teachers' knowledge about

self-regulated learning and helping teachers know how to teach self-regulated learning techniques will lead to positive outcomes on student achievement.

Suggestions for Further Study

Based on these results of teachers' reported beliefs and practices about self-regulated learning and what has been agreed upon by many involved in educational research (Boekaerts, 1997, 1999; Bronson, 2000; Nota, Soresi, & Zimmerman, 2004; Pintrich, 2000; Randi & Corno, 2000; Schunk & Zimmerman, 1998; Winne, 1995; Zimmerman, 2000, 2002; Zimmerman & Schunk, 1995, 2000, 2002), it is widely accepted that self-regulated learning behaviors are vital to students' taking ownership for their learning and achievement. Further research is needed to assist in facilitating self-regulated learning among students and to ensure that it becomes a common practice in among teachers during instruction.

While the survey instrument provides valuable information, a future study may use classroom observations, and may find it beneficial to record classroom observations, for the purpose of looking for teacher practices indicative of developing self-regulated skills within students. This study used open coding to allow themes to emerge from the data, but future studies that look specifically for SRL development strategies will provide more data as well as descriptive statistics and frequencies. This type of data will also be beneficial to the field of SRL because it will provide information about what types of tasks teachers are performing more often than others in developing students into self-regulated learners. Before professional development can be provided, it is imperative to recognize know what teachers are already doing in their classrooms.

While the survey results showed that the teachers agreed with the benefits of self-regulated learning behaviors, the findings from this study do not suggest what may have

hindered some teachers from facilitating the development of SRL in their students. In the survey teachers reported that there are aspects of SRL development that they do not do daily or weekly. However, it is only with repetition, persistent practice and work towards becoming self-regulated that a student can develop this ability. It is true that some students will become self-regulated on their own, but students who need the assistance in developing this set of behaviors need it to be taught consistently and repetitively. Teachers can easily incorporate tasks that help their students develop into self-regulated learners, but survey results showed that this is not something they do. Research is needed to determine why teachers do or do not take the opportunity to develop their students into self-regulated learners.

Because teachers in this study did not use classroom discourse to help facilitate the development of self-regulated learners, it is important to find out what kind of professional development or assistance would be needed to help them with this task. Perhaps teachers do not know what self-regulated learning is or how it benefits students. Perhaps they do not know what strategies can be used to teach students how to become self-regulated. Professional development will be most beneficial when it is targeted at the needs of those involved. Finding out from teachers what is needed from them in order to help them become teachers of self-regulated behaviors will help focus professional development.

The four teachers for this study who volunteered to be observed represented different teachers with a variety of experience and education including: a first year teacher, a National Board Certified Teacher, a teacher who has earned her doctorate degree in curriculum, and a teacher with over 20 years experience. The survey did not

ask about teachers educational backgrounds or if they were National Board Certified. A study that explores a larger sample of teachers from varied backgrounds to see which are more likely to help their students become self-regulated learners could provide some information concerning what how type of and recency of training experiences impacts the facilitation of self-regulating learning among students. For example, if the study findings showed that teachers with advanced degrees were more inclined to help their students develop SRL behaviors, would this be because this information has been introduced and taught to them in advanced classes? Research into pre-service programs is needed to determine if self-regulated learning is a topic that it is taught and practiced among prospective teachers. Research is needed to determine where teachers are learning about self-regulated learning and what they are learning about it. Assessing the beliefs and practices among pre-service faculty assigned to teach methods courses as it relates to the teaching of self-regulated learning is also another study that is worthy of investigation.

While the focus of this study has been at the secondary level, research with elementary and middle school teachers is needed to gauge their beliefs and practices as they relate to self-regulated learning. SRL is a skill that not only benefits students across all subjects, but across all grade levels. It is a skill that should taught as soon as students enter school and that continues throughout their educational experience. However, once again, it is important to establish a baseline of teachers' beliefs and practices in order to know where to go next.

Conclusion

The results of this study provide evidence that the participating teachers agreed with the benefits of self-regulated learners, but as shown through a sample of teachers

who participated in classroom observations, beliefs do not always translate to practice. Observations showed that teachers are not always facilitating the development of SRL within their students. The survey findings showed that teachers most often completely agreed or somewhat agreed with benefits of teaching SRL practices. However, the findings also showed that teachers do not incorporate those practices that will help students become self-regulated learners on a daily basis.

Teachers agree with the benefits of self-regulation learning and that it leads to the next step of helping them become teachers who help their students develop into self-regulated learners. When there is a congruence between beliefs and practices that is consistent over time, and this skill that becomes a routine, it is more likely to become a natural part of instructional practices that characterize learning in schools.

Research has shown that students learn what they are taught and that self-regulated learning is a skill with important benefits. Teachers can model behaviors to help students develop into self-regulated learners. Teachers can ask questions that help students become self-regulated. It is time that the self-regulated learning be taught to students, however, a large part of developing this skill needs to come from teachers' modeling and suggesting to students.

Students from the United States of America need to be able to compete globally, especially in the fields of science, technology, engineering, and mathematics. Developing students into self-regulated learners allows them to better problem solvers, goal planners, and to facilitate their own learning. Students skilled in the processes of being self-regulated learners will be more able to compete against students from all nations for educational and professional opportunities. It is imperative that we instruct

teachers how to develop their students into self-regulated learners. This study has provided evidence as to the disconnection between teachers' self-reported practices and their actual practices in the classroom. With this knowledge, it is now time to assist teachers with developing self-regulated learners.

APPENDIX A
SURVEY INSTRUMENT

1. I agree to participate in this survey.
   1=yes, 2=no

How often do you suggest or model the following behaviors to your students?
1=daily, 2=weekly, 3=monthly, 4=yearly, 5=never

2. Students sort out their notes after class if they get confused while taking notes during class.
3. Students try to figure out what they are confused about.
4. Students skim new course material, before studying it, to see how it is organized.
5. Students ask themselves questions to make sure they understand the material they have been studying in class.
6. Students change the way they study in order to fit the teacher's teaching style.
7. Students try to decide what they are supposed to learn rather than just reading it over when studying.
8. Students decide which topics they don't understand well when studying for the course.
9. Students set goals for themselves when studying for a class.

To what extent do you agree or disagree with the following?
1=completely agree, 2=somewhat agree, 3=neither agree nor disagree, 4=somewhat disagree, 5=completely disagree

10. Self-regulated students participate in goal planning more than students who are not self-regulated.
11. Self-regulated students recognize when they have questions about their work.
12. Self-regulated students are able to determine what help they need during assignments.
13. Self-regulated students know what they need to do to reach their goals.
14. Self-regulated students reflect on their schoolwork.
15. Self-regulated students are able to monitor their interactions while learning.
16. Self-regulated students are aware of their classroom learning environment.

How often do you do the following?
1=daily, 2=weekly, 3=monthly, 4=yearly, 5=never

17. I assign tasks that help students become self-regulated learners.
18. I ask questions that help students become self-regulated learners.
19. I model behaviors that help my students become self-regulated learners.
20. I encourage my students to become self-regulated learners.

APPENDIX B
OBSERVATION PROTOCOL

Teacher:
Date:
Time:

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APPENDIX C
IRB APPROVAL AND CONSENT FORM

UF Institutional Review Board
UNIVERSITY of FLORIDA

PO Box 112250
Gainesville, FL 32611-2250
352-392-0433 (Phone) 352-392-9234 (Fax)
irb2@ufl.edu

DATE: TO: April 8, 2009

FROM: Alice Dix
252 N. Hidden Tree Drive
St. Augustine, FL 32086
Ira S. Fischler, PhD; Chair
University of Florida Institutional Review Board 02

SUBJECT:

TITLE: Approval of Protocol #2009-U-0303

SPONSOR: Teachers' Beliefs and Practices of Self-Regulated Learning

None

I am pleased to advise you that the University of Florida Institutional Review Board has recommended approval of this protocol. Based on its review, the UFIRB determined that this research presents no more than minimal risk to participants. Your protocol was approved as an expedited study under category 7: *Research on individual or* group *characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus* group, *program evaluation, human factors evaluation, or quality assurance methodologies*.

Given this status, it is essential that you obtain signed documentation of informed consent from each participant. Enclosed is the dated, IRB-approved informed consent to be used when recruiting participants for the research. If you wish to make any changes to this protocol, *including the need to increase the number of participants authorized,* you must disclose your plans before you implement them so that the Board can assess their impact on your protocol. In addition, you must report to the Board any unexpected complications that affect your participants.

It is essential that each of your participants sign a copy of your approved informed consent that bears the IRB approval stamp and expiration date.

If you have not completed this protocol by March 31, 2010, please telephone our office (392-0433), and we will discuss the renewal process with you. It is important that you keep your Department Chair informed about the status of this research protocol.

ISF:dl

An Equal Opportunity Institution

Informed Consent

Protocol Title: Examining Secondary Mathematics Teachers' Beliefs and Practices of Self-Regulated Learning

Please read this consent document carefully before you decide to participate in this study.

Purpose of the research study: To investigate secondary mathematics teachers' beliefs and practices of self-regulated learning.

What you will be asked to do in the study: Complete a survey administered via the internet. Five teachers will be asked to volunteer to be observed in their classrooms while teaching mathematics.

Time required: Survey - approximately 10 minutes. Observations - three observations lasting no more than 90 minutes each.

Risks and Benefits: No more than minimal risk. There is no direct benefit to the participants in this research. However, this study will add to the understanding of teachers' beliefs and practices about self-regulated learning.

Compensation: There is no compensation for participating in the survey. Teachers who agree to be observed will be given a $20 gift card to Target.

Confidentiality: Your identity will be kept confidential to the extent provided by law. Your information for the survey will be assigned a code number. The list connecting your name to this number will be kept in a locked file in my faculty supervisor's office.

Pseudonyms will be used for observation notes.

When the study is completed and the data have been analyzed, the list will be destroyed. Your name will not be used in any report.

The final results will be presented in a dissertation to be presented for completion of the doctoral program at the University of Florida.

Voluntary participation: Your participation in this study is completely voluntary. There is no penalty for not participating.

Right to withdraw from the study: You have the right to withdraw from the study at anytime without consequence. You do not have to answer any questions you do not want to answer.

Whom to contact if you have questions about the study:

Approved by
University of Florida
Institutional Review Board 02
Protocol # 2009-U-0303
For Use Through 03/31/2010

Alice Dix, 252 N Hidden Tree Dr., St. Augustine, FL 32086. Phone 352-875-5177.
Email: acbl005@ufl.edu

Supervisor's contact information:

Dr. Linda Behar-Horenstein, Department of Educational Administration and Policy. 1202 Norman Hall, Gainesville, FL 32611. Phone 352-392-2391 ext. 299. Email: lsbhoren@ufl.edu

Whom to contact about your rights as a research participant in the study:

UFIRB Office, Box 112250, University of Florida, Gainesville, FL 32611-2250; Phone 392-0433.

I have read the procedure outlined above. I voluntarily agree to participate in this study and have received a copy of this description.

Participant's Signature and Date

Principal Investigator's Signature and Date

Approved by
University of Florida
Institutional Review Board 02
Protocol # 2009-U-0303
For Use Through 03/31/2010

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BIOGRAPHICAL SKETCH

Alice Catharine Dix received her bachelor's degree in business administration from Saint Leo University in 1998. She worked as an accounting assistant for three years before beginning her career as a high school mathematics teacher in 2001. She taught in Marion County for four years while also earning her master's degree in business administration from Webster University in 2004. Alice married Chad Dix in 2005 and moved to Saint Augustine, Florida. She received a fellowship from the University of Florida and worked as a research assistant for four years while completing the doctoral program as a full-time graduate student. Alice will remain in Florida working in education.