THE VALUE OF STUDENT SELF-REGULATED LEARNING: A STUDY OF TEACHER PERCEPTIONS AND PRACTICES IN AN AFTERSCHOOL SETTING

by

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ABSTRACT

Being a self-regulated learner is essential for thriving in an ever-changing world. The ability to think and learn independently is necessary for a person to navigate inevitable change. However, most educators do not explicitly teach students about the processes of self-regulated learning. Plausible explanations are that many instructors have a limited understanding of this broad concept and have limited time for studying and implementing effective practices that promote self-regulated learning.

To allay the problem of having little time to devote to this worthwhile endeavor, the researcher utilized a middle school's afterschool program as a means for leading a schoolwide initiative to support students in regulating their own learning. Participants in the study formed a guiding coalition of four math teachers who sought to improve their practices. The researcher designed a two-week, real-time, on-site professional development series for the afterschool math team to study and implement effective teaching and learning strategies that foster self-regulated learning.

Through a review of the literature pertaining to the process of change, self-regulated learning, quality afterschool programs, and effective professional development, the researcher aimed to bridge the gap between theory and practice by helping teachers explicitly promote self-regulated learning in a supportive environment. Although this qualitative action research study was abbreviated due to the COVID-19 pandemic, positive results unfolded. All four participants had a deeper understanding of self-regulated learning and had adapted their individual practices to support students in regulating their own learning. Three main conclusions emerged from the study: (1) Meaningful collaboration is important in improving both student and teacher learning.

(2) Using a model to explain student self-regulated learning is important for effective implementation. (3) Implementing and sustaining lasting change requires time.

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CHAPTER 1:

INTRODUCTION

Overview

Change is inevitable. Change is constant. Change is universal. All individuals and all organizations face a myriad of changes and challenges throughout their existence. Extensive research and opinions regarding change are readily available to offer advice and strategies for all sorts of situations. The education field is no exception. Evidence from research conducted over the past two decades reveals that effective schools thrive in times of change by maintaining a focus on equal opportunity for all students (Lezotte & Snyder, 2011). Effective schools ensure all students can develop lifelong learning skills during their school years. Albert Einstein is credited with the idea that the ultimate goal of education is to train the mind to think (Calaprice, 2010). Being able to think and learn independently is necessary in reaching one's potential and in dealing with inescapable change. The foundation of lifelong learning is self-regulated learning. Effective schools embed student self-regulated learning in all aspects of their organization. Using a systems perspective can manage all components of the school as a unified whole to achieve success in developing lifelong learners (Baldridge, 2017). On-site, real-time professional development training is an avenue for schools to assist staff in developing knowledge and strategies for promoting student self-regulated learning.

Background

Self-regulated learning involves a collection of behaviors and dispositions, including the ability to self-observe, self-judge, and self-react (Frey, Hattie, & Fisher, 2018). Being a self-regulated learner is essential for thriving in an ever-changing world.

Kay (2010) urges schools to teach 21st century skills that can prepare students to "think, learn, work, solve problems, communicate, collaborate, and contribute effectively throughout their lives" (p. xx). Wagner (2008) refers to 21st century skills as survival skills and identifies them as critical thinking and problem solving; collaboration; agility and adaptability; initiative and entrepreneurialism; oral and written communication; accessing and analyzing information; and curiosity and imagination. The inherent nature of these skills emphasizes the need for self-regulated learning. Wiliam (2018) cautions that 21st century skills are not isolated skills that can be learned in one subject and applied in another. Rather, these skills should be embedded in a knowledge-rich curriculum (Wiliam, 2018). Hirsch (2016) asserts that "a well-rounded, knowledge-specific curriculum can impart needed knowledge to all children and overcome inequality of opportunity" (p. 191). A self-regulated learner equipped with essential knowledge will be able to exercise 21st century skills with confidence.

Teaching students to become self-regulated learners takes time. Self-regulated learning consists of three components: cognition, metacognition, and motivation (Paris & Paris, 2001). The cognition component includes the skills and habits that are necessary to encode, memorize, and recall information as well as think critically. Teaching students to problem solve and use critical thinking strategies situated within a specific learning domain takes time. The metacognition component of self-regulated learning involves skills that enable learners to understand and monitor their cognitive processes. To effectively carry out this essential piece of self-regulated learning, teachers must create an environment in which learning becomes visible (Hattie, 2012). Intentionally crafting such an environment takes time. The motivation component of self-regulated learning is

mainly driven by students' self-efficacy (Pajares & Schunk, 2001). "Self-efficacy refers to perceived capabilities to learn or perform behaviors at designated levels" (Schunk, 2016, p. 58). Implementing strategies, such as goal setting and monitoring progress, that promote self-belief and denounce self-disbelief takes time. Self-regulated learning is an integral and time intensive component of quality education.

Teaching students to become self-regulated learners requires collaboration. Effective teachers observe one another, give and receive peer feedback, and participate in lifelong learning experiences such as professional development activities. Stronge (2007) asserts that "professional development training must be tailored to the individual teachers within a particular context" (p. 103). Professional development helps teachers change their classroom habits and improve upon their practices (Wiliam, 2018). "Effective professional development is intensive, ongoing, and connected to practice; focuses on the teaching and learning of specific academic content; is connected to other school initiatives; and builds strong working relationships among teachers" (Darling-Hammond, Wei, Andree, Richardson & Orphanos, 2009, p. 44). Intensive and sustained collaborative professional development activities have a greater chance of influencing teaching practices and, in turn, leading to a positive impact on student learning and development of students' self-regulated learning skills.

Teaching students to become self-regulated learners requires systems thinking. Baldridge (2017) suggests that schools should focus on core values and concepts that include a systems perspective, student-centered excellence, and organizational learning and agility. Each component of the system should be flexible working toward the common goal of student support. Because teaching students to become self-regulated

learners is multi-faceted, afterschool programs could be considered as an avenue for delivering teacher professional development sessions that focus on helping students excel through self-regulated learning. Holstead and King (2011) describe effective afterschool programs as those that include activities geared toward the development of academic skills, maintain strong links to the school day curriculum, and are managed by a highly qualified and trained staff. Training staff to help students regulate their own learning while simultaneously developing their academic skills is a feasible possibility. Using the afterschool program as a key component in supporting students' self-regulated learning through real-time teacher professional development could have a significant impact on the effectiveness of the entire school.

Purpose of the Study

In 2016, the Tennessee Department of Education adopted new state academic standards for Mathematics and English Language Arts. The reason for the change in standards was to ensure that Tennessee graduates are equipped to succeed in post-secondary education and in the workforce. The change in standards has impacted every student, every teacher, and every school across the state. The new math standards are fewer in number but require a solid understanding of essential mathematical concepts, a high degree of procedural skill and fluency, and the ability to apply the math to solve contextual problems. The standards are designed around progressions from grade to grade for students to connect their learning across grades. With the progressive design of the standards, students can build new understanding onto foundations built in previous years. The intent of the progressions is to ensure gaps are not created in the mathematical education of students. The current reality is that gaps can exist for those students who

were taught under the direction of the previous standards and then transitioned to the new standards. If no supports were offered for students to learn the math in the new standards from previous grades, mathematical knowledge gaps can be an obstacle to student progress.

Big Pine Middle, a pseudonym for a middle school in Tennessee, has been wrestling with the changes in the state's academic standards for the past three years. Data from the state's year-end summative assessment reveals a steady decline each year in the number of students proficient in mathematics. Benchmark and Response to Intervention (RTI) tests administered each nine weeks during the past three years have also revealed a steady decline in students' mathematical understanding. On the benchmark tests, open-ended and multiple-select items are missed by most students. This illustrates that while students can generally use procedures correctly, many are unable to demonstrate an understanding of the reasons for doing them and an understanding of the reasonableness of a solution as required in the current standards. Furthermore, data from RTI screening exams over the past three years reveals that more, rather than fewer, students require interventions in computational fluency from year to year. Therefore, apparent gaps exist in many students' mathematical knowledge.

Curriculum should not be the reason for the problem at Big Pine Middle because teachers have been diligent in teaching the new mathematics standards and providing opportunities for students to engage in rigorous tasks since adoption of the new standards. Rather, a potential reason for the school's difficulty in improving students' mathematical understanding could be because of not addressing the learning gaps. Students need time and guidance to build the math knowledge they missed because of the standards changes.

Because most students' progress will be gradual, they need consistent support from year to year in guiding their own learning. Two potential opportunities are available at Big Pine Middle: efficiently using the school's afterschool program and incorporating self-regulated learning strategies into the curriculum. The afterschool program is a vital and thriving component of the school with forty-eight percent of the student population regularly participating. Based on the previous year's state summative assessment, eighty-one percent of the afterschool students are not proficient in their mathematical understanding. The afterschool program could be an avenue for supporting students in improving their mathematical understanding as well as improving their self-regulated learning skills. Therefore, the purpose of this study is to engage the afterschool math teacher team in a professional development series focusing on self-regulated student learning using targeted math skills and to examine classroom practices that promote self-regulated learning.

Statement of the Problem

Although the field of education is always changing, its chief purpose of preparing students for adult life remains the same. For adults to thrive in an ever-changing world, they need to be self-regulated lifelong learners. However, educators rarely explicitly teach students how to self-regulated their own learning. Many teachers do not have a solid understanding of the concept and are not aware of fundamental practices to adopt in promoting self-regulated learning. An effective avenue for equipping educators with new knowledge and tools is professional development. This study will examine the impact of a professional development series focused on self-regulated learning.

The setting for this study is a rural middle school in Tennessee, Big Pine Middle, that is seeking to equip students with supports to self-regulate and improve their learning. The afterschool program at Big Pine Middle is an essential component of the school that serves as a direct link to students' families. The afterschool program has a stellar reputation among students, families, and school faculty for providing a positive and supportive environment for students. The program serves almost half of the school's student population and has a waiting list of students who wish to join. Because of its ideal environment and high percentage of students who require academic support, Big Pine Middle's afterschool program will be used as the avenue to initiate the endeavor to explicitly teach students to self-regulate their learning. The researcher along with the afterschool math teachers who volunteer to participate in the study will form a guiding coalition for promoting student self-regulated learning at Big Pine Middle.

With the intent of understanding and solving a specific problem as quickly as possible, this study will utilize a qualitative action research design (Patton, 2015). The researcher will organize a professional development series for participants to collaboratively study and apply practices to promote student self-regulated learning. The aim of the series will be to equip participants with a deeper understanding of self-regulated learning along with individualized practices that can be incorporated into their unique instructional environments. The professional development sessions will take place on the afterschool's campus and participants will apply their learning in real-time during their own math classes over a two-week period. The researcher will gather qualitative data to investigate the impact of the collaborative professional development

series on teachers' perceptions and practices relating to student self-regulated learning. Following are the research questions:

1. What are afterschool math teachers' perceptions regarding the impact of student self-regulated learning on student academic achievement?
2. What are current practices afterschool math teachers use to promote student self-regulated learning?
3. After engaging in a professional development series on self-regulated learning, how do afterschool math teachers change (a) their perceptions regarding the impact of student self-regulated learning and (b) their practices used to promote student self-regulated learning?

Theoretical Framework

Successful mathematics students are able to see themselves as their own mathematics teachers (Almarode et al., 2019). Teachers play a primary role in helping students regulate their own learning. The challenge lies in making self-regulated learning visible. Almarode et al. (2019) describe successful self-regulated mathematics students as being able to:

> (1) know their current level of mathematics learning; (2) know where they are going next in mathematics and be confident to take on the challenge; (3) select the most appropriate tools, problem-solving approaches, and skills to guide their learning; (4) seek feedback and recognize errors are opportunities to enhance their mathematics learning; (5) monitor their progress and adjust their mathematics learning; and (6) recognize their learning and support their peers in their own mathematics learning journey (p. 215).

Being able to recognize and verbalize the indicators of self-regulated learning can help teachers support students in developing this essential lifelong learning skill. Zimmerman (2002) developed a theoretical model representing three distinct phases of self-regulated learning. Figure 1 represents the cyclical phases and subprocesses of self-regulated learning:

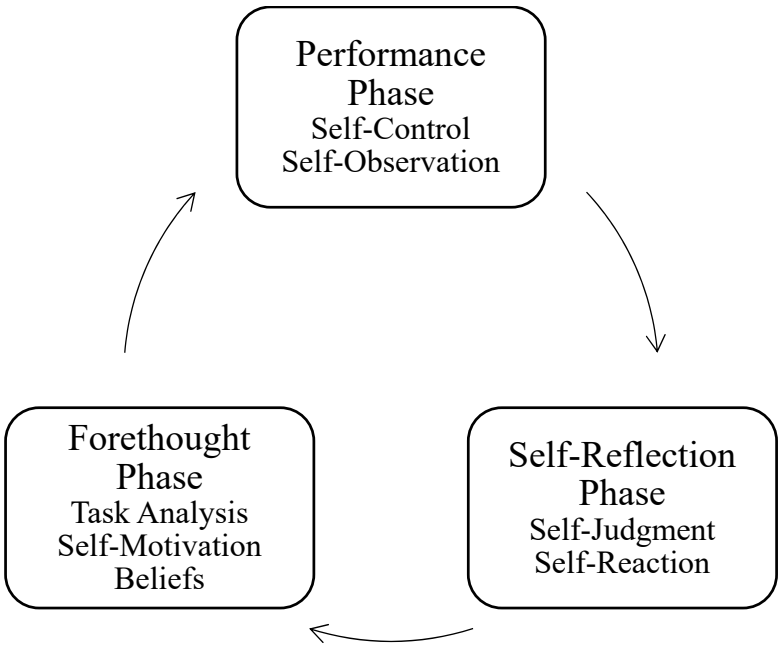

Figure 1. Phases and Subprocesses of Self-Regulated Learning (Zimmerman, 2002)

For this study, the phases and subprocess of self-regulated learning as introduced by Zimmerman (2002) will be used to guide the understanding and analysis of self-regulated learning.

Definition of Terms

Coronavirus COVID-19 pandemic: A global pandemic of coronavirus disease 2019 that forced business and school closures in Spring of 2020.

Self-regulated learning: For purposes of this study, the term self-regulated learning refers to self-generated thoughts, feelings, and actions that are planned and adapted to the attainment of goals (Zimmerman, 2000).

Self- efficacy: "Self-efficacy refers to perceived capabilities to learn or perform behaviors at designated levels" (Schunk, 2016, p. 58).

Professional Development (PD): Guskey (2002) defines professional development programs as "systematic efforts to bring about change in the classroom practices of teachers, in their attitudes and beliefs, and in the learning outcomes of students" (p. 381).

Significance of the Study

The results of this study can provide practical strategies for implementing classroom as well as school-wide practices aimed at developing student self-regulated learning. Implementing effective practices for students to guide their own success can help schools that are struggling to positively impact student academic achievement. Because of the new rigorous academic standards as well as inevitable life changes, students must learn to regulate their own learning.

Limitations, Delimitations, and Assumptions

This study has some limitations within which the findings should be interpreted carefully. First, the study was interrupted due to the coronavirus COVID-19 pandemic and was conducted within a two-week window of time. The narrow time frame is not sufficient for implementing the complex process of student self-regulated learning.

Additionally, the lack of quantitative data limits the evaluation of student learning. Furthermore, the researcher had a working relationship with the four educators from the same school which could have influenced their participation and candidness. Nonetheless, the researcher assumes participants were honest and had sincere intentions of carefully considering the content of the professional development series.

Summary

Change is constant in the lives of all individuals and in all organizations. Schools should incorporate practices that help both adults and students navigate change throughout their lives. Promoting student self-regulated learning is the main ingredient in helping students develop lifelong learning skills to deal with change. Providing professional development for educators that is relevant to their unique situation can be an effective avenue for helping them deal with change. This chapter contains background information about the purpose of the study, the research questions that will be addressed, and the significance the study may provide for education.

CHAPTER II:

REVIEW OF LITERATURE

Introduction

Implementing effective processes to meet the needs of individual learners within a school always has been and always will be a challenge for educators. Inevitable cultural changes, both internal and external, require school leaders to constantly evaluate and sometimes adapt their processes and practices to maximize student learning. Effective schools embrace a systems approach to making changes that can provide all students with supports to becoming self-directed and lifelong learners. Lezotte and Snyder (2011) contend that "the effective school is a complex system of manageable, interdependent components propelled by broad staff commitment to successfully accomplish the mission of learning for all" (p. 29). Systems thinking considers all components of a school that can have a positive impact on student learning. This literature review explores afterschool programs, a sometimes overlooked component of schools, as an avenue for implementing teacher professional development aimed at promoting student self-regulated learning. The unconventional nature of embarking on such an endeavor also warrants an examination of the process of change.

Process of Change

In all aspects of life, change is inescapable. Kotter (2012) states "the problem for us today is that stability is no longer the norm" (p. 16). The current pace of societal and technological change demands a relentless assimilation of new information affecting everyday life. However, change should not be dreaded. According to Aristotle, change in all things is sweet. Change signals growth, strength, and new opportunities. As a

result of such potential benefits, frameworks have been created for providing a systematic approach to managing the process of change. One such example is the ADKAR model which is used to understand change at an individual level (Hiatt, 2006). The model has five elements that are referred to as building blocks that must be in place for a change to be realized. Balestracci (2003) describes a similar four-step process to generating change at a personal level. The two approaches are compared in Table 1.

Table 1

Processes of Change

Hiatt's Process	Balestracci's Process	Common Themes
Awareness of the need for change	Achieving awareness	Awareness represents a person's understanding of why the change is being made and the risk of not changing
Desire to support and participate in the change	Choosing a breakthrough in thinking	Desire represents a personal choice and motivation in deciding to support and engage in a change
Knowledge of how to change	Gaining a breakthrough in knowledge	Knowledge represents the information, training, and education necessary to know how to change
Ability to implement required skills and behaviors	Choosing a breakthrough in behavior	Ability is turning knowledge into action and is achieved when a person demonstrates capability to implement the change

Table 1 cont.

Processes of Change

Hiatt's Process	Balestracci's Process	Common Themes
Reinforcement to sustain the change		Internal and external factors that sustain a change. Balestracci includes reinforcement in the previous stage and emphasizes the need for continuing training and feedback as does Hiatt.

Using a framework to drive the process of change is commendable but implementing a change solely because of uncertain or tumultuous events should be avoided. Collins and Hansen (2011) assert that "just because your environment is rocked by dramatic change does not mean that you should inflict radical change upon yourself" (p. 10). Furthermore, Newton and Tarrant (1992) warn that many people believe that gathering more resources is an effective solution for change. To the contrary, more is not always the most effective approach to change. Organizations that adopt a deliberate and purposeful process of change with "clear performance markers, self-imposed constraints, and within a proper timeframe" are more apt to thrive in volatility (Collins & Hansen, 2011, p. 65). Simply stated, implementing change requires calculated effort.

Resistance. No matter the degree of planning involved in implementing change, Balestracci (2003) warns that resistance to change is inevitable. Hultman (1999) defines resistance as a state of mind reflecting an unwillingness or unreceptiveness to change. Human factors that can fuel resistance and an unwillingness to change include "fear of the unknown; lack of information; threat to core skills and competence; threat to power

base; fear of failure; reluctance to experiment; and reluctance to let go" (Shen, 2008, p. 75). For reasons such as these, many individuals either passively or aggressively resist change.

Because resistance to change is an inevitable aspect of human nature, change agents can promote an alternative approach to change. Morin (1975) defines a change agent as one who "organizes and influences people in a unique, personal way" (p. 42). One way of influencing people is by sharing unique perspectives. For example, Beenen (2016) recommends the unique perspective of viewing change as an opportunity rather than a threat. Table 2 illustrates the differences between viewing change as a threat and viewing change as an opportunity:

Table 2

Views of Change

Change as Threat	Change as Opportunity
Behavioral inhibition	Behavioral activation
Prevent losses	Promote gains
Avoid punishments	Pursue rewards
Prevent loss of skills	Develop new skills
Avoid failure	Pursue performance

Framing change as a challenge to be conquered rather than as a threat to be avoided can lead to success. In addition to promoting a change in mindset, change agents can tailor strategies to the types of resistance that can be encountered. For example, if resistance stems from lack of information, use education to communicate reasons for the desired change (Kotter & Schlesinger, 2008). If resistance stems from reluctance to

experiment, encourage resisters to participate in the design and implementation of the change (Kotter & Schlesinger, 2008). The individual needs of those involved in the change should be the driver of the strategies used in the change process. Questioning participants to generate insights and consider their unique perspectives can be an effective way to diagnose resistance and design solutions (Hultman & Hultman, 2018). There are many reasons for resistance to change and there are many approaches that can be taken to avoid stagnation. They all center around individual needs.

Education Sector. Change, along with resistance, is a natural occurrence in all industry sectors. The educational sphere is no exception. Change in education, commonly referred to as education reform, has taken on many faces throughout the years. In recent years, education reform has centered around an adoption of more rigorous standards and assessments as well as greater accountability for teachers and schools. As with changes in the past, current changes have triggered much discussion and scrutiny.

Robinson and Aronica (2015) assert that standardizing content, teaching, and assessment has largely failed by its own terms and created more problems than it is solving. Evidence of little or no growth in student learning as a result of the standards movement has prompted many to rethink the meaning of education. Resnick (2017) encourages educators to focus on creative learning to ensure all children can become full and active participants in tomorrow's society. In addition, Robinson and Aronica (2015) urge teachers to inspire students to achieve at their highest levels, help students acquire skills to become confident, independent learners, and enable students to develop creativity. These examples of calls to action that encourage creative thinking coupled

with mandated reform in standardizing teaching reveal the intensity of changes within the education sector.

To provide order and focus when undergoing change, educators can embrace a collaborative model referred to as a professional learning community (PLC). Although there are different variations, the overarching idea of a PLC is to promote educators working together to implement necessary change. DuFour (2004) declares that initiating and sustaining a PLC "requires the school staff to focus on learning rather than teaching, work collaboratively on matters related to learning, and hold itself accountable for the kind of results that fuel continual improvement" (p. 11). Maintaining a focus on student learning can be a gamechanger for accomplishing meaningful change.

By placing student learning at the center of its work, a PLC can streamline efforts to meet the needs of individual learners. Posing purposeful questions is an avenue for accomplishing such a feat. DuFour, DuFour, Eaker, Many, & Mattos (2016) offer four specific questions that can be used by a PLC to drive its work:

> (1) What knowledge, skills, and dispositions should every student acquire as a result of this unit, this course, or this grade level?
>
> (2) How will we know when each student has acquired the essential knowledge and skills?
>
> (3) How will we respond when some students do not learn?
>
> (4) How will we extend the learning for students who are already proficient? (p. 36).

These four questions not only promote clarity for accomplishing the goal but also encourage flexibility. Crafting and implementing a plan to respond when some students

do not learn and extending learning for those who are proficient is pliable based on real-time data from students themselves. Rather than waiting until the end of the year to make necessary adjustments, PLC team members can "continually seek feedback, and monitor and adjust plans" as they are being implemented (Eaker, R., & Keating, J., 2012, p. 131). The PLC framework can provide order and focus in a changing environment through collaboration and purposeful questions.

Embracing a collaborative culture specifically among mathematics teachers can be of value because of challenges unique to teaching the subject. Students need to experience mathematics in meaningful ways to understand big ideas and know how and why math works (Rawding & Call, 2016). Because professional learning communities are fundamentally about student learning, teachers who work within a PLC can collaboratively design and plan math lessons that clarify mathematical concepts (Brodie, 2013). Furthermore, current reform efforts ask teachers to teach in ways that promote an integrated, connected view of math, rather than a procedural, rule-based view (Zwiep & Benken, 2013). Rigorous standards require students to go beyond learning facts, rules, algorithms, and procedures in order to become critical thinkers and problem solvers (Luna, Rush, Gramer, & Stewart, 2014). This change in learning expectations necessitates a change in teaching practices to provide students with opportunities to develop thinking skills along with math content (Willis, 2010). However, because of high stakes testing, many math teachers focus on covering content rather than devoting time to teaching metacognitive strategies (Marshall, Horton, Igo, & Switzer, 2009). To circumvent this tendency, Rigelman, Crane, Petrick, and Shrier (2018) suggest math teachers begin to collaborate and work within a PLC to become more confident in their

abilities to promote a deeper understanding of math as well as develop students' thinking skills. With a focus on student learning within a PLC, collaborative efforts can break the barriers of reluctance to use new teaching strategies. Through collaboration, teachers can hone their skills and use change as an opportunity to enhance student learning rather than as an obstacle.

Even with collaborative PLC efforts, some educators will resist change. DuFour et al., (2016) suggest focusing on resisters' behavior rather than their attitudes. For example, learning experiences can be designed for educators, including resisters, that make student learning the priority and require educators to act in new ways. "These new experiences, in turn, can lead to new attitudes over time" (DuFour et al., 2016, p. 220). Muhammad (2018) conducted a research study that focused on how the behavior of educators in thirty-four schools supported or hindered change that could promote universal student achievement. The research yielded four distinct groups that adopted different belief systems about education: believers, tweeners, survivors, and fundamentalists (Muhammad, 2018). Believers believe all students are capable of learning and that they have a direct impact on student success, tweeners are new to the school culture, survivors are burned out and merely survive from day to day, and fundamentalists are opposed to change and organize to resist any change initiative (Muhammad, 2018). Being aware of the different belief systems within a school's culture can aid in developing a strategy for overcoming resistance to change. Varied approaches can be used to implement productive change aimed at improving student learning. Table 3 summarizes a few of the strategies that can be used within each group to promote positive change.

Table 3

Strategies to Support Change

CLASSIFICATION	STRATEGY
Believers	Encourage believers to engage in intellectual discourse with those opposed to ensuring success for all students.
Tweeners	Connect tweeners with a stellar example of professionalism and grant access to that mentor on a regular basis. Connect tweeners to the school community.
Survivors	Remove survivors from the conditions that caused the depression until he or she can get proper treatment.
Fundamentalists	Clearly communicate reasons for proposed changes and support the proposals with empirical and anecdotal evidence of effectiveness from different sources. Create frequent opportunities for fundamentalists to voice their viewpoint. Extend a public olive branch to opposing viewpoints by encouraging intellectual dialogue about organizational goals.

Adapted from: *Transforming School Culture: How to Overcome Staff Division*.

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In addition to using approaches specific to each educator classification, effective strategies can also be implemented that are applicable to all groups. Examples are celebrations and professional development. Muhammad (2018) asserts that "celebration in school provides consistent reinforcement about what is important" (p. 126). When leaders take time to celebrate achievements and remind one another of their purpose and priorities, educators are more likely to embrace the purpose and change involved (DuFour et al., 2016). Professional development can also be used to provide support for all types of educators. Eaker and Keating (2012) declare "the quality of student learning is directly linked to the quality of adult learning" (p. 142). High quality professional development can help teachers keep abreast of effective strategies for managing inevitable change.

Professional Development

Guskey (2002) defines professional development programs as "systematic efforts to bring about change in the classroom practices of teachers, in their attitudes and beliefs, and in the learning outcomes of students" (p. 381). Teacher professional development (PD) is commonly viewed as a promising way to help teachers navigate the changes and demands placed on them by ever-expanding accountability measures (Smylie, 2014). Because of its potential impact on teacher practice and student learning, professional development has been a highly researched topic in recent decades.

Historical Context. Before the 1950s, professional development for teachers consisted of inservice trainings, usually at the outset of their careers, in which teachers were given a set of directives and expected to improve if those directives were followed (Lieberman, 1995). Beginning in the 1950s, a new approach was taken in which professional development researchers began to advocate for more collaborative approaches that gave teachers greater agency in their own improvement and continuing education (Parker & Golden, 1952). Fullan (1991) reveals that although teachers are generally required to take part in professional development because of contractual obligations, most report that they see PD as the most promising and readily available route to growth on the job in becoming a better teacher. For most teachers, becoming better means changing their practices to benefit students in enhancing learning outcomes (Harootunian & Yarger, 1981). Fullan and Miles (1992) assert that teachers' overarching expectation of professional development is to provide them with specific and practical ideas for implementing change in their classrooms. As a result, frameworks have evolved over the years to study and evaluate the effects of professional development.

Initial frameworks were based on the assumption that change in teachers' beliefs and attitudes precedes a change in student learning (Jones & Hayes, 1980). Guskey (2002) introduced an alternative framework which suggests that "significant change in teachers' attitudes and beliefs occurs primarily after they gain evidence of improvements in student learning" (p. 383). Guskey's framework is captured in Figure 2:

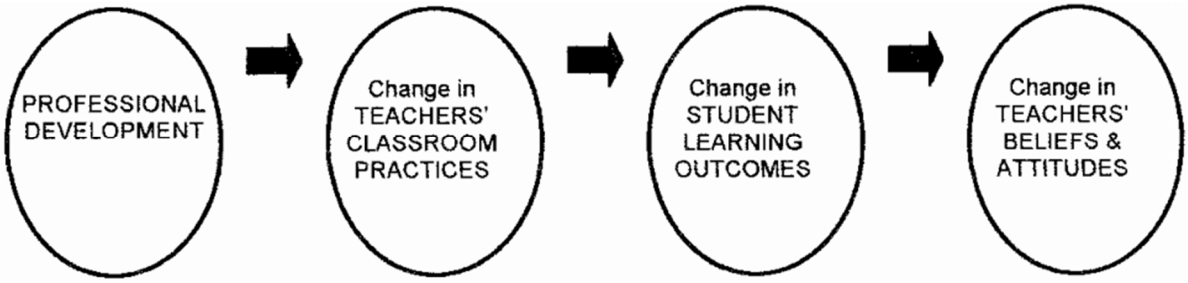

Figure 2. Guskey Framework of Teacher Change

Guskey's framework introduced a new perspective that could be used more accurately when considering professional development for experienced teachers. The framework also explicitly connects the common purpose of all professional development to that of change in practices, beliefs, and attitudes for the improvement of student learning (Griffin, 1983). Professional development became recognized as one of the critical mediators in improving teaching practice and student learning (Desimone, Smith, Hayes, & Frisvold, 2005). After Guskey's framework was introduced, other researchers began to develop even more detailed frameworks for evaluating professional development. Desimone (2009) proposed using a common conceptual framework for evaluating the effectiveness of professional development. Desimone's model is shown in Figure 3:

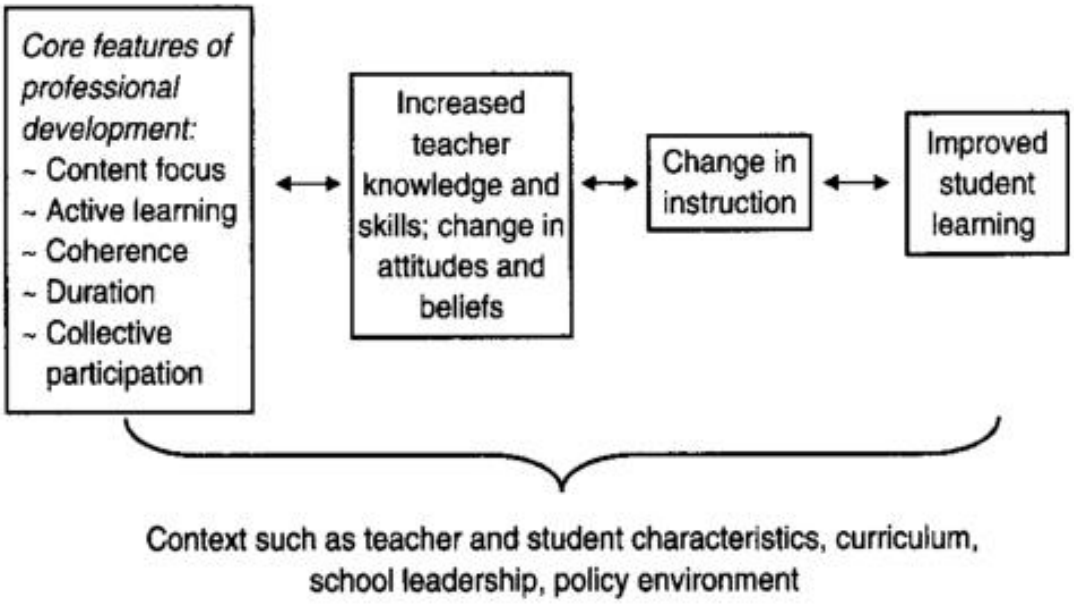

Figure 3. Desimone's Core Conceptual Framework

The model allows testing both a theory of teacher change and a theory of instruction, both of which are necessary in understanding the impact of professional development (Wayne, Yoon, Cronen, Garet, & Zhu, 2008). Both Desimone's and Guskey's frameworks have been used by researchers as a comprehensive framework to evaluate professional development (Kang, Cha, & Ha, 2013; Lowden, 2006). A basic understanding of the historical context of professional development and its evaluation aids in the understanding of current debates regarding professional development.

Current Debates. Two areas of continuing debate regarding professional development involve facilitators and time. Trends in the past ten years have shifted in favor of teachers, teacher leaders, administrators, or coaches within the school acting as facilitator of professional development (Hoekstra, Brekelmans, Beijaard, & Korthagen,

2009; Avalos, 2011). Bellanca (2009) reveals that professional developers have relied on the workshop as the principle practice since the 1980s. A shift to a site-based professional developer can lead to more effective results since an inside leader is more apt to be a change agent within the learning community (Bellanca, 2009). However, Loucks-Horsley, Stiles, Mundry, Love, and Hewson (2010) caution that it is equally important to develop the knowledge, skills, and abilities of the facilitators and to provide them with ongoing, sustained opportunities to reflect on and make improvements in their facilitator capacity. Another trend has been to advocate for a longer duration in professional development trainings (Hunzicker, 2011; Garet, Porter, & Desimone, 2001). Desimone (2011) suggests that "activities should be spread over a semester and should include 20 hours or more of contact time" (p. 69). On the other hand, Guskey (2009) asserts that emphasis should be placed on the quality of the program rather than the duration. "Although time may be vitally important, simply adding more for professional learning does not invariably make things better" (Guskey, 2009, p. 230). Although proponents of professional development sometimes disagree about intricacies of the subject, the overall consensus is that effective professional development is at the center of educational reform and has the capacity to positively impact teacher practice and student learning (Lieberman, 1995; Lowden, 2006; Guskey, 2009).

Mathematics Context. An ongoing discussion among professional development advocates has ensued for several decades concerning the need for trustworthy and scientifically valid evidence on the professional development characteristics that help improve student learning (Parker & Golden Jr, 1952; Yoon, Duncan, Lee, Scarloss, & Shapley, 2007; Guskey, 2009). "Research on how to evaluate inservice education remains

as a fascinating area of study" (Parker & Golden Jr, 1952, p. 198). Some advocate for a common conceptual framework that can be used to evaluate professional development (Desimone, 2009). Although no uniform model was used in the literature reviewed for this study, empirical evidence from many studies reveal common characteristics of effective professional development for teachers. Most data gleaned from the study could be applied to all subject areas, but an emphasis was placed within the context of mathematics. Five major themes can be used to describe effective mathematics professional development: supportive, job-embedded, instructional focus, collaborative, and ongoing (Hunzicker, 2011).

First, supportive professional development "considers the needs, concerns, and interests of individual teachers along with those of the school or district" (Hunzicker, 2011, p. 177). An example of a recent need that involves teachers, schools, and districts is the efficient and effective use of technology. Professional development integrated within large initiatives, such as technology, can benefit both teachers and students by supporting core math knowledge with the use of technology (Kilion, 2016). Response to intervention (RTI) in mathematics is another current need for professional development. This national initiative has trickled down to states, districts, schools, and teachers. Because of the complexities in effectively using data from RTI screenings to support individual student learning, intense supportive professional development is essential (Lyons, Genareo, Simpson, Foegen, Stecker, & Olson, 2019). Supportive professional development is vital to accomplish the goals of collective efforts aimed at meeting the needs of students.

Second, “effective professional development is job-embedded, making it relevant and authentic” (Hunzicker, 2011, p. 178). Professional development should be intensive, ongoing, and connected to practice with a focus on student learning within a specific curriculum content (Darling-Hammond, et al. 2009). Examples of job-embedded professional development include individual professional development plans, mentoring, district curriculum development, peer study groups, inquiry and action research, and long-term courses within the district with in-class support (Lowden, 2006). Garet et al. (2001) describe job-embedded professional development as integrated into the daily life of the school with a greater likelihood of enhancing the knowledge and skills of participants. Such learning prompts teachers to consider possibilities, try new things and analyze the effectiveness of their actions. The move from professional development with a life span of one or two days to job-embedded PD is connected to longer term strategies aimed at changing not only teaching practice but also the school culture (Lieberman, 1995).

Third, effective professional development is instructionally focused. Darling-Hammond et al. (2009) reveal that teachers say much of the professional development available to them is not useful because it is not content-related. A focus on content includes consideration of the unique challenges within subject matters. For example, Garet et al. (2001) contend that teachers of a particular subject such as mathematics can hold narrow, inflexible views of content. Therefore, professional development requires differentiation, support, and feedback to encourage flexibility and a focus on student learning (Garet et al., 2001). “Because instructionally-focused professional development

relates directly to their students, teachers consider it highly relevant and authentic" (Hunzicker, 2011, p. 178).

Fourth, effective professional development is collaborative. Because teachers differ in the way they learn informally within the context of reform, professional development should provide support for teacher learning, should be differentiated, and should encourage collaboration (Hoekstra, Brekelmans, Beijaard, & Korthagen, 2009). Those teachers, who are continuously experimenting and collaborating, should be encouraged in their endeavors (Guskey, 2009). Teachers value opportunities to learn from and with one another around common goals
such as instructional planning, analyzing student work and peer observations (Loucks-Horsley, Stiles, Mundry, Love, & Hewson, 2010). Lieberman (1995) contends that people learn best through active involvement and by thinking about and articulating what they have learned. (Darling-Hammond et al. 2009) maintain that a structure of strong working relationships among teachers can enrich the work of both teachers and students .

Finally, "effective professional development is ongoing, a combination of contact hours, duration and coherence" (Hunzicker, 2011, p. 178). Effective professional development requires considerable time, and that time must be well organized, carefully structured, and purposefully directed (Guskey & Yoon, 2009). Garet et al., (2001) assert that professional development should be integrated into the daily life of the school to yield a lasting impact. Coherent job-embedded learning opportunities for teachers, including in depth collaboration regarding instruction, can guide teachers to reflect on their practice—beginning to think about their teaching in new ways and trying out new things in the classroom (Camburn & Han, 2015). When professional development

opportunities are related to each other as well as to school goals or state learning standards, teachers' motivation and commitment to the ongoing learning process can be strengthened (Hunzicker, 2011).

Hunzicker (2011) suggests using an evaluation system of professional development endeavors to maximize success. A checklist is an option to use as a planning tool, an in-progress survey, or as a final evaluation of effectiveness. Hunzicker (2011) suggests using the checklist in Table 4.

Table 4

Effective professional development for teachers: A checklist

	Yes	Partly	No
Supportive			
• Does it combine the needs of individuals with school/district goals?			
• Does it engage teachers, paraprofessionals and administrators?			
• Does it address the learning needs of specific schools, classrooms, grade levels and/or teachers?			
• Does it accommodate varying teaching assignments, career stages and teacher responses to educational innovation?			
• Does it accommodate individual learning styles and preferences?			
• Does it integrate teacher input and allow teachers to make choices?			
Job-Embedded			
• Does it connect to teachers' daily responsibilities?			
• Does it include follow-up activities that require teachers to apply their learning?			
• Does it require teachers to reflect in writing?			
Instructional-focus			
• Does it emphasize improving student learning outcomes?			
• Does it address subject area content and how to teach it?			
• Does it help teachers to anticipate student misconceptions?			
• Does it equip teachers with a wide range of instructional strategies?			

Table 4 cont.

Effective professional development for teachers: A checklist

	Yes	Partly	No
Collaborative • Does it engage teachers physically, cognitively, and emotionally? • Does it engage teachers socially in working together toward common goals? • Does it require teachers to give and receive peer feedback?			
Ongoing • Does it require a high number of contact hours over several months' time? • Does it provide teachers with many opportunities over time to interact with ideas and procedures or practice new skills? • Does it 'build' on or relate to other professional development experiences in which teachers are required to engage?			

Professional development is an integral component of the education system that has been used and studied for many years. Reflecting on the evolution of PD enables educators to learn from and build upon these learning ventures. Guskey (2009) reminds that truly effective professional development consists of a collection of core elements that must be adapted to the unique contextual characteristics of a particular school. Because no professional development

practice, strategy, approach, method, or activity works well under all conditions, the goals for individual teachers, schools, and districts should be considered to implement effective professional development practices within its context.

Self-Regulated Learning

No matter the subject or grade level taught, most educators agree that an overarching goal in teaching students is to help them become independent, lifelong

learners. Educators should intentionally incorporate skills into daily lessons and routines to help students regulate their own learning. Since not all educators are well-versed in how to effectively teach students such skills, a study of self-regulated learning could be beneficial to both teacher and student. An effective avenue for teachers to acquire and apply knowledge about self-regulated learning could be through professional development studies. A study of self-regulated learning could include the theoretical background along with practical knowledge of how to teach and apply the skill.

Theory and Research. During the 1970s, researchers began to study students' abilities to learn on their own along with their motivation to do so (Zimmerman & Pons, 1986). Various labels for this type of student learning included "self-controlled," "self-instructed," or "self-reinforced" (Zimmerman & Pons, 1986, p. 615). During the 1980s, researchers began to refer to the topic of students learning on their own as self-regulated learning (Corno, 1986). Zimmerman (1986) explains that students can be described as self-regulated to the degree that they are metacognitively, motivationally, and behaviorally active participants in their own learning process. Zimmerman and Martinez-Pons (1988) elaborate:

> In terms of metacognitive processes, self-regulated learners plan, organize, self-instruct, and self-evaluate at various stages during the acquisition process. From a motivational vantage, self-regulated learners perceive themselves as self-efficacious, autonomous , and intrinsically motivated. In terms of behavior, self-regulated learners select, structure, and even create social and physical environments that optimize acquisition (p. 284).

For purposes of this study, the term self-regulated learning refers to self-generated thoughts, feelings, and actions that are planned and adapted to the attainment of goals (Zimmerman, 2000).

Paris and Paris (2001) summarize the importance of self-regulated learning from an educator's perspective to be that self-regulated learning can help describe the ways that people approach problems, apply strategies, monitor their performance, and interpret the outcomes of their efforts. As a result, "teachers can provide information and opportunities to students of all ages that

will help them become strategic, motivated, and independent learners" (Paris & Paris, 2001, p. 89).

Researchers have developed frameworks to study self-regulated learning, and many were designed within a social cognitive theory construct. Schunk (2016) explains that Bandura's social cognitive theory "stresses the idea that much human learning occurs in a social environment" (p. 117). Social cognitive theorists assume that self-regulation involves three classes of sub-processes: self-observation, self-judgment, and self-reaction (Zimmerman, 1989). Self-observation, or deliberate attention to aspects of one's behaviors, informs and motivates a student towards attainment of a goal (Schunk, 1990). Self-judgment involves comparing present performance with one's goal, and self-reaction involves students' beliefs about their progress towards a goal (Schunk & Zimmerman, 1997). Zimmerman (1989) notes that using a social cognitive approach to research self-regulated learning is helpful because of observable learning strategies used by students. The observations can "prove helpful in guiding academic analyses and interventions" (Zimmerman, 1989, p. 337). Table 5 depicts a list compiled by Zimmerman (1989)

showing examples of self-regulated learning strategies used by students who participated in his research studies.

Table 5

Self-Regulated Learning Strategies

Categories/Strategies	Definitions
1. Self-evaluating	Statements indicating student-initiated evaluations of the quality or progress of their work; e.g., “I check over my work to make sure I did it right.”
2. Organizing and transforming	Statements indicating student-initiated overt or covert rearrangement of instructional materials to improve learning; e.g., "I make an outline before I write my paper."
3. Goal-setting and planning	Statements indicating students’ setting of educational goals or subgoals and planning for sequencing, timing, and completing activities related to those goals; e.g., "First, I start studying two weeks before exams, and I pace myself."
4. Seeking information	Statements indicating student-initiated efforts to secure further task information from nonsocial sources when undertaking an assignment; e.g., "Before beginning to write the paper, I go to the library to get as much information a s possible concerning the topic."
5. Keeping records and monitoring	Statements indicating student-initiated efforts to record events or results; e.g., "I took notes of the class discussions"; "I kept a list of the words I got wrong.”

Table 5 cont.

Self-Regulated Learning Strategies

Categories/Strategies	Definitions
6. Environmental structuring	Statements indicating student-initiated efforts to select or arrange the physical setting to make learning easier; e.g., "I isolate myself from anything that distracts me"; "I turned off the radio so I can concentrate on what I am doing.
7. Self-consequating	Statements indicating student arrangement or imagination of rewards or punishment for success or failure; e.g., “If I do well on a test, I treat myself to a movie."
8. Rehearsing and memorizing	Statements indicating student-initiated efforts to memorize material by overt or covert practice; e.g., "In preparing for a math test, I keep writing the formula down until I remember it."
9. Seeking social assistance	Statements indicating student-initiated efforts to solicit help from peers, teachers, and adults; e.g., "If I have problems with math assignments, I ask a friend to help."
10. Reviewing records	Statements indicating student-initiated efforts to reread notes, tests, or textbooks to prepare for class or further testing; e.g., "When preparing for a test, I review my notes."

Students’ self-regulated learning strategies observed through research studies show that motivational beliefs alone are not enough for successful academic performance. Students need to have both positive self-efficacy and specific strategies to be successful in the classroom (Pintrich & De Groot, 1990).

Implications for Practice. At a time when students often appear to lack both the will and skill to achieve academically, educators need instructional approaches that can offer direction and insight into the processes of self-regulated learning (Zimmerman, 1990). Paris & Paris (2001) proclaim that all good teachers include components of self-regulated learning in what they teach and expect of their students. Communication is essential in developing self-regulated learners. "Schools should communicate to both parents and students that no one has more control over a student's success than the student himself or herself" (Dembo & Eaton, 2000). Teachers should communicate to students and parents explicit strategies for developing self-regulated learning (Dignath & Büttner, 2018). A highly effective means to teach students about self-regulated learning is by using a model (Panadero, 2017). As self-regulated learning is taught with explicit instruction, directed reflection, and metacognitive discussions, a model is beneficial for directing and deepening understanding (Paris & Paris, 2001). Many models have been developed and when choosing the ideal model for a context, consideration should be given to the specific needs of the students (Panadero, 2017). Some models emphasize social processes while others emphasize learning. Zimmerman (2002) developed a model that focuses on the phases and subprocesses of learning. The model shown in Figure 4 illustrates the three-part cycle that can be used to either study the main ideas or the intricacies of self-regulated learning (Zimmerman, 2002).

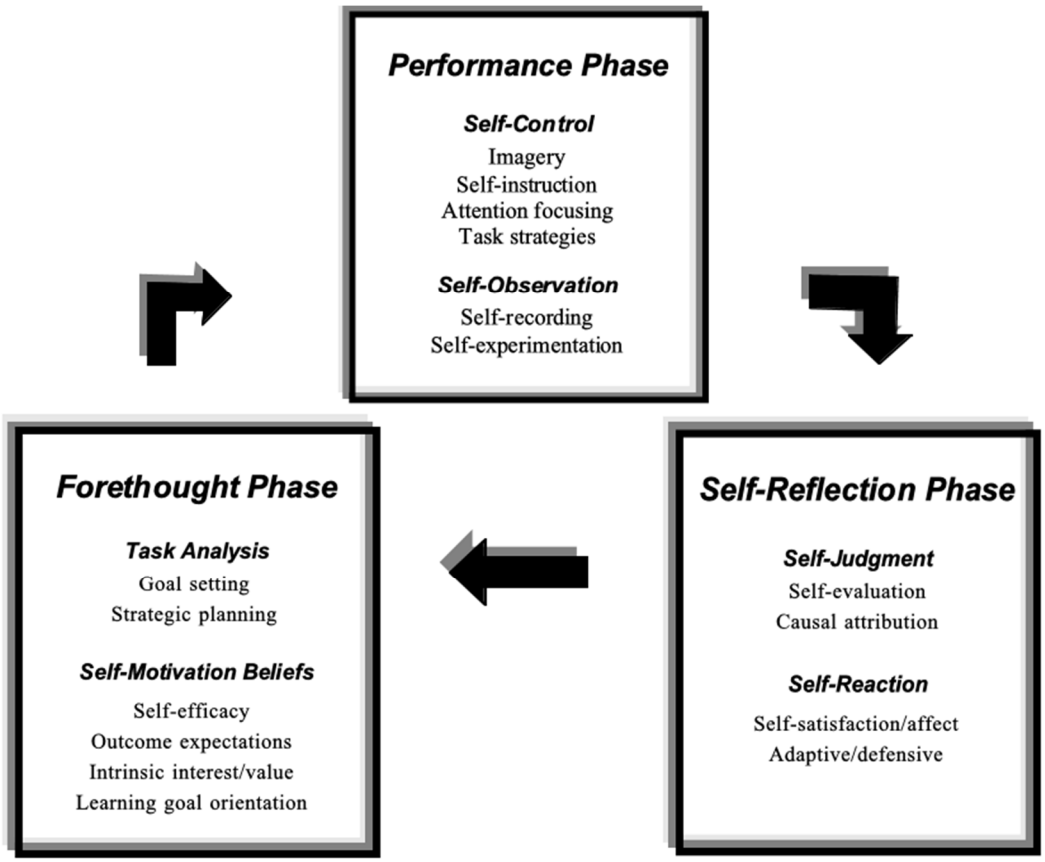

***Figure 4*:** Phases and Subprocesses of Self-Regulated Learning (Zimmerman, 2002)

"The forethought phase refers to processes and beliefs that occur before efforts to learn; the performance phase refers to processes that occur during behavioral implementation, and self-reflection refers to processes that occur after each learning effort" (Zimmerman, 2002, p. 65). During the forethought phase, students can be taught how to set goals and activate content and metacognitive knowledge (Schunk & Mullen, 2013). Students can be taught strategies for engaging metacognitive awareness, managing motivation, and exerting behavioral self-control in the performance phase (Schunk & Mullen, 2013). In the self-reflection phase, learners can be taught to "self-evaluate their performance against their personal goals rather than other learners'

performance, and they make strategy attributions instead of ability attributions" (Zimmerman, 2002, p. 69). Considering the phases and subprocesses of self-regulated learning can benefit teachers in deciding when and how to incorporate the teaching of self-regulated learning strategies.

Mathematics Context. "Self-regulated learning is most effective when it is linked to academic content" (Schunk, 2016, p. 439). Three mathematical teaching and learning strategies aligned within the Zimmerman (2002) self-regulated learning model include goal setting, meaningful mathematical discourse, and self-reflection. NCTM (2014) asserts "effective teaching of mathematics establishes clear goals for the mathematics that students are learning, situates goals within learning progressions, and uses the goals to guide instructional decisions" (p. 10). When teachers stress the importance of learning to solve problems (learning goals) rather than merely solving problems (performance goals), the learning goals can lead to higher motivation and achievement (Schunk, 1996). According to Hattie et al. (2017), "knowing one's learning destination is crucial for mathematics students" (p. 39).

A second mathematical strategy to promote self-regulated learning in the classroom is facilitating meaningful mathematics discourse. "Effective teaching of mathematics facilitates discourse among students to build shared understanding of mathematical ideas by analyzing and comparing student approaches and arguments" (NCTM, 2014, p. 10). Requiring students to explain their reasoning and providing support through probing questions and think alouds directs learners to become active participants in their own learning (Pape, Bell, & Yetkin, 2003). Hattie (2012) recommends that 50% of classroom time be devoted to student discourse and interactions

with peers. If teachers devote such a large chunk of time to collaboration, specific strategies should be employed to promote effective self-regulation. Fennell, Kobett, & Wray (2017) suggest using interviews to engage in brief and informal in-the-moment conversations with a student or small group to facilitate and develop meaningful discourse. Using hinge questions is another strategy for facilitating whole-class discussion to check for understanding at hinge points in a lesson and model mathematical discussion (Fennel et al., 2017). Sperling et al. (2016) suggest self-explanation as an elaborative strategy to facilitate processing of content and conceptual connections with prior knowledge to develop self-regulated learners. For example, when learning how to solve fractions, a mathematics student might be prompted to self-explain both conceptually and procedurally how one turns mixed numbers into improper fractions (Sperling et al., 2016). In addition, deliberate and explicit discussion about the ways in which students' specific behaviors, such as seeking information or seeking assistance, helped accomplish mathematical tasks is essential in developing self-regulated learning (Pape et al., 2003). Teaching students to think about and verbalize specific skills and tactics that would be most helpful in accomplishing a mathematical task can help students improve their self-awareness and enable them to become self-regulated learners (Landine & Stewart, 1998). As students make their learning strategies public, both mathematical learning and self-regulated learning can be enhanced.

Finally, self-reflection is a teaching and learning strategy that can be used to promote self-regulated learning. Self-reflection helps the learner self-monitor his or her own progress toward a specific goal. "The ability to think about your own thinking promotes learners' self-awareness" (Almarode et al., 2019, p. 213). Rhodes (2019)

recommends using problem-solving journals that can be used by both the student and the teacher to reflect on the problem-solving process and as launching points for class discussions. According to Hattie et al. (2017), "self-reflection helps students understand where they were and where they are now" (p. 187). Figure 5 represents prompts provided by Hattie et al. (2017) that can be used for facilitating students' self-reflection.

- How well do I think I understand _____ now?
- Why do I think that?
- How has my understanding increased as a result of today's lesson?
- What questions do I still have about the math I learned today?
- What do I still need to work on? How do I know?
- How do I rate my effort during today's lesson? Why?
- How do I rate my teamwork today? Why?
- Did I ask for help? Did I offer to help others? Did I encourage my teammates?
- How did I contribute to my group's efforts?
- If I could do _____ over again, what would I do differently? Why?
- What advice would I have for another student who was about to start this same lesson?

Figure 5: Prompts for Facilitating Students' Self-Reflection

Dewey (1933) suggests that reflective thinking is an active, persistent and careful process by which learners make meaning from experience. Through reflection, learners can control the outcome of achievement by meaningfully assessing what they currently understand and can do and what they need to be able to understand and do (Dewey, 1933). Self-reflection is a necessary technique for mathematical learners to develop expertise and avoid making the same errors multiple times when solving similar problems (Hattie, 2017).

Teaching strategies for becoming self-regulated learners are best practiced within an effective learning environment. Jansen and Bartell (2013) describe a productive mathematics middle school environment as one that involves "teaching so that every student's learning matters, communicating high expectations for students, creating a welcoming and inviting classroom community, and engaging students in learning mathematics" (p. 33). Hattie (2012) asserts the optimal classroom climate for learning is one that generates an atmosphere of trust. In mathematics, mistakes are the essence of learning so a climate in which it is understood that it is okay to make mistakes is essential (Hattie, 2012). Embedding intentional strategies for promoting self-regulated learning coupled with a trusting environment can have a positive impact on student learning.

Afterschool Programs

Highly effective mathematics classrooms promote students "assessing and monitoring their own progress toward mathematics learning goals and identifying areas in which they need to improve" (NCTM, 2014, p. 56). Although effective teaching involves intentionally promoting these self-regulated learning strategies, some students need extra support. For students who need more help to be successful academically, what happens before and after school can be as important as what happens during the school day (Lauer et al., 2006). Afterschool programs can be an avenue of support for students to develop self-regulated learning skills.

Background. The use and scope of afterschool programs has always varied with the local context (Spielberger & Halpern, 2002). Historically, affluent families used afterschool programs to provide enrichment for their children, and African Americans used afterschool programs for cultural and educational activities (Warfield-Coppock,

1992). Halpern (2000) traced the origins of afterschool programs for low-income children to the 1870s. Early proponents of these programs had a variety of motives and objectives ranging from avoiding dangers to children found in the streets to a desire to re-socialize children or prevent juvenile delinquency (Halpern, 2000). In recent times, because of more rigorous academic standards and an increase in accountability, afterschool programs focus more on academic advancement and remediation for at-risk students. In 1994, Congress appropriated funds for the 21st Century Learning Centers (21st CCLC) program, requiring that grants be made for projects that benefit the educational, health, social service, cultural and recreational needs of a rural or inner-city community (Phillips, 2010). Today, the 21st CCLC is the largest federal funding stream for afterschool programming. The CCLC funded afterschool programs are present in all fifty states and serve over one million students across the country (USDOE, 2018). Each year the program gathers data regarding the extent to which students improved in grades, state summative assessments, homework, classroom participation, and behavior. The data and performance indicate that the CCLC program touches students' lives in ways that will have far reaching impact (USDOE, 2018). With the growth of afterschool programs in general, various research studies have been conducted to evaluate their effectiveness. Although some studies conclude that many programs do not improve the academic outcomes of students (Zief, Lauver, & Maynard, 2006; James-Burdumy, Dynarski,& Deke, 2007), the overall conclusion of meta-analyses is that most afterschool programs have a positive impact on academic, social, and emotional outcomes of students (Holstead & King, 2011). Furthermore, there is a consensus among practitioners

regarding effective program practices (Granger, 2008). Table 6 summarizes effective practices in afterschool programs for promoting academic achievement.

Table 6

Effective Practices of Afterschool Programs

Effective Practice	Description	Citation
Focus on academic skills	Develop specific goals with a focus on specific skills and a sequenced curriculum with active involvement of students	Granger, 2008
	Maintain an orientation toward mastery of knowledge and skill	Vandell, 2013
	Encourage learning, not just the completion of an assignment	Miller, 2007
Maintain strong links to school day curriculum	Maintain positive and proactive interactions for homework help	Cross, Gottfredson, Wilson, Rorie, & Connell, 2010
	Develop lesson plans that are aligned with school standards	Holstead & King, 2011
	Foster communication between teachers and program staff about specific students' academic needs	Huang & Dietel, 2011

Table 6 cont.

Effective Practices of Afterschool Programs

Effective Practice	Description	Citation
Employ highly qualified and trained staff	Treat students respectfully and support them in completing tasks	Khan & Lauzon, 2018
	Maintain high expectations and standards for all students Deliver personalized, high-quality instruction	Hall, Yohalem, Tolman, & Wilson, 2003
	Provide professional development opportunities directly relevant to the afterschool program	Holstead & King, 2011

Opportunities. Quality afterschool programs implement effective practices that can have a positive impact on student learning (Zhang & Byrd, 2006). In the state of Tennessee, the Department of Education promotes a strong academic program within its afterschool initiatives. The state administers funding for two different extended learning programs: 21st Century Community Learning Centers (21st CCLCs) and Lottery for Education Afterschool Programs (LEAPs). Both have a goal to provide Tennessee students with academic enrichment opportunities that reinforce and complement the regular academic program (TDOE, 2016). Each recipient of afterschool funds must meet the following requirements:

1. Serve youth 5 – 18 years old.
2. Enroll 50% of students who meet one of the following criteria: qualify for free/reduced lunch; be at risk of educational disadvantage and failure due to circumstances of abuse, neglect or disability; be at risk of state custody due to

family dysfunction; be enrolled in and attending a public school failing to make adequate yearly progress (AYP); or be at risk of failing one or more subjects or are behind grade level by at least one year.

3. Offer only educationally based activities.
4. Offer services to students for 15 hours per week.
5. Incorporate reading skills development and enhancement based on Tennessee academic standards.
6. Incorporate math or science skills development and enhancement based on Tennessee academic standards.
7. Provide academic mentoring or tutorial assistance.
8. Offer sports or leisure opportunities.
9. Establish, implement, and report on measurable program goals and objectives called SMART goals - S: Specific; M: Measurable; A: Attainable R: Relevant; T: Timely.
10. Establish performance goals for all students to reach proficiency or better in reading/language arts and mathematics (TDOE, 2016).

The state's requirement to prioritize student learning in afterschool programs creates tremendous opportunities for supporting at-risk students. A structured afterschool program focused on providing relevant, challenging experiences tailored to individual students' needs can support all students in obtaining a quality education (Holstead & King, 2011).

In addition to afterschool programs, the Tennessee Department of Education maintains a statewide initiative to support student learning called Response to Instruction

and Intervention (RTI^2). "RTI^2 is a framework for teaching and learning that includes regular screenings to identify student areas of need and a tiered model of intervention for those that need additional help" (TDOE, 2018, p. 2). TDOE (2018) explains that the program uses a framework to identify three tiers of instruction:

> Tier I: All students receive research-based, high quality, instruction using Tennessee State Standards in a positive behavior environment that incorporates ongoing universal screening and ongoing assessment to inform instruction. In general, 80–85 percent of students will have their needs met by Tier I supports. Tier II: In Addition to Tier I, extra support is provided to students who have been identified as "at risk" in academic or non-academic skills or have not made adequate progress with Tier I supports alone. In general, 10-15 percent of students will receive Tier II interventions. Tier III: In Addition to Tier I, extra support is provided to students who have not made significant progress in Tier II interventions or who are significantly below grade level in academic or non-academic skills. Tier III interventions are more explicit and more intensive than Tier II interventions (p. 3).

Both state initiatives (afterschool programs and RTI^2) share the same overall goal of supporting individual students' learning needs. This creates an opportunity for afterschool programs in Tennessee to complement schools' RTI^2 efforts in providing interventions for enhancing student learning. Furthermore, both programs could be used to develop students' self-regulated learning strategies. Table 7 demonstrates how the three are logically linked together in a mathematics context.

Table 7

RTI, Afterschool, and SRL Common Objectives

RTI^2 Math Objectives	Afterschool Objectives	Student Indicators of Self-Regulated Learning
Devote time for math fact fluency and problem solving (Gersten et al., 2009)	Maintain an orientation toward mastery of knowledge and skills (Vandell, 2013)	Seek information and Rehearse and memorize (Zimmerman, 1989)
Devote time for students to work in pairs or small groups (Lembke, Hampton, & Beyers, 2012)	Provide academic mentoring to each student (TDOE, 2016)	Seek social assistance (Zimmerman, 1989)
Assist students in setting goals and charting progress (TDOE, 2018)	Establish performance goals for each student (TDOE, 2016)	Set goals and make plans (Zimmerman, 1989)

Afterschool programs are ideal environments for providing students with support in learning mathematics. Consequently, the Tennessee Department of Education requires all afterschool programs to focus on increasing students' math proficiency (TDOE, 2016). Durlak, and Weissberg (2007) suggest using evidence-based approaches in afterschool programs to accommodate the needs of its students. Examples of such methods used in afterschool programs to advance mathematical understanding include tutoring, direct instruction, online math programs, and interdisciplinary projects (Baker, Rieg, & Clendaniel, 2006; Huang, Craig, Xie, Graesser, & Hu, 2016; Lin et al., 2013; Holstead & King, 2011). Besides enhancing students' mathematical knowledge, using evidence-based strategies provide an opportunity for educators to model and encourage self-regulated learning. For example, interdisciplinary projects and tutoring encourage students to seek information as well as social assistance while online math programs can

assist students in rehearsing and memorizing essential math skills. Additionally, direct instruction can be used to model goal setting and planning. The afterschool setting provides numerous and flexible opportunities for educators to build students' knowledge while simultaneously supporting their learning during the regular school day and developing their self-regulated learning strategies.

Challenges. Although tremendous opportunities are available, implementing a quality afterschool program does not come without challenges. Designing a system to meet the needs of individual learners requires collaborative efforts with targeted data and practical strategies. According to Toledo (2018), the main deterrent to creating a high performing afterschool program is a lack of collaboration. To overcome this challenge, robust processes for carrying out program goals should be developed through ongoing professional development (Toledo, 2018). Holstead and King (2011) suggest that another deterrent to an effective program is the lack of collaboration between the afterschool staff and regular school day teachers to analyze targeted student data. Efforts should be made to develop working relationships among staff and teachers to share relevant student data such as RTI^2 screenings and interventions, state summative results, and course progress. St Clair and Stone (2016) identify yet another challenge of failing to continually improve the afterschool program to meet the needs of a diverse student body. Similarly, Zhang and Byrd (2006) suggest a lack of action to remedy areas of improvement identified in program evaluations can have a negative impact on the project's efficiency. Toledo (2018) suggests afterschool staff collaboratively reflect on successes and areas of improvement to pinpoint solutions and maintain momentum in the program. Challenges within afterschool programs do exist, but so do solutions.

Summary

Educational reform is a current yet common occurrence that has yielded new challenges as well as opportunities. Schools should assess and utilize all components of their organizations to implement and benefit from change. Professional development is an effective avenue for diffusing effective teaching and learning practices in ever-changing school environments (Sun, Penuel, Frank, Gallagher, & Youngs, 2013). Self-regulated learning is an example of an essential practice students should be taught during their school careers to enrich their adult lives. Wachholz (1994) astutely points out that adults usually think of students as beneficiaries of change rather than as participants in a process of change. Empowering students with skills to prompt and regulate their own learning can be beneficial in times of change. Professional development sessions can be used for educators to collaborate and learn about best practices for embedding self-regulated learning into their settings. Additionally, afterschool programs can be used as a support system to practice student self-regulated learning and even administer professional development sessions. This chapter contains a review of the literature related to the key topics of change, teacher professional development, student self-regulated learning, and afterschool programs.

CHAPTER III:

METHODOLOGY

Introduction

The purpose of this study was to engage Big Pine Middle's afterschool math teacher team in a professional development series focusing on self-regulated student learning using targeted math skills and to examine classroom practices that promote self-regulated learning. Data gathered from participants provided insight into classroom practices that promote self-regulated learning. This chapter gives information regarding the qualitative action research design used within this study.

Restatement of the Problem

Student performance data from school, district, and state math assessments at Big Pine Middle revealed a decline in students' mathematical understanding over the past three years. The state's math standards changed in that time frame but a collaborative effort to mitigate possible learning gaps had not been adopted by the school. To address the problem, the researcher chose the positive and productive environment of Big Pine Middle's afterschool program to support students' mathematical learning. With forty-eight percent of the student population regularly attending the afterschool program, an opportunity existed for positively impacting student learning. Because the school was providing strong mathematical instruction during the regular school day, the plan was to support those efforts by focusing on individual students' learning gaps and incorporate strategies to promote student self-regulated learning. The researcher designed a collaborative professional development series to guide the afterschool math team in delivering targeted math support while teaching students strategies to regulate their own

learning. The intent was to promote and guide productive collaboration within the afterschool math team through needs-based and ongoing professional development efforts. This study investigated the impact of the professional development series on teacher practices regarding student self-regulated learning. Following are the research questions:

1. What are afterschool math teachers' perceptions regarding the impact of student self-regulated learning on student academic achievement?
2. What are current practices afterschool math teachers use to promote student self-regulated learning?
3. After engaging in a professional development series on self-regulated learning, how do afterschool math teachers change (a) their perceptions regarding the impact of self-regulated learning and (b) their practices used to promote student self-regulated learning?

Research Design and Procedures

This action research study utilized a qualitative inquiry and research design. In general terms, the study aimed to explore a problem or issue and identify variables that cannot be easily measured (Creswell, 2018). Action research "is undertaken for the sake of investigating practice, usually in concert with those working on the front lines, and improving that practice based on what is discovered" (Hatch, 2002, p. 31). The researcher aimed to study the perceptions and practices of Big Pine Middle's afterschool math teachers regarding student self-regulated learning and provide collaborative opportunities to improve those practices.

The researcher served as a teacher and co-coordinator of the afterschool program where the research took place. Because of the researcher's prior working relationships with participants, a potential for bias existed. Triangulation can strengthen a study by using several kinds of data (Patton, 2015). Therefore, four data types were collected during the study: observations, interviews, teacher artifacts, and participant journals. Figure 6 depicts the types of data collected during the study.

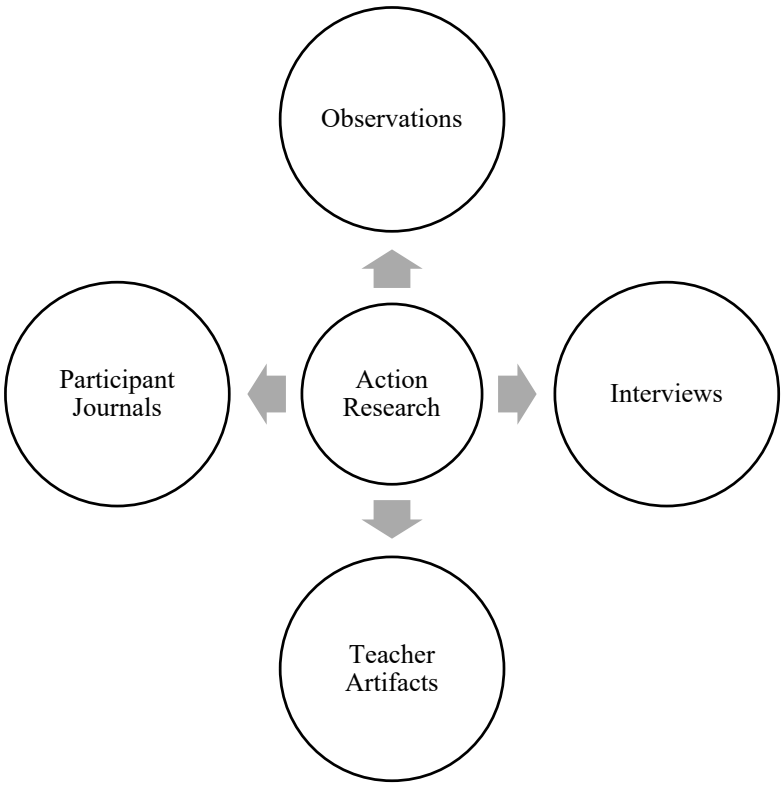

Figure 6. Research Data Types

"A particularly strong type of qualitative inquiry combines fieldwork observations with in-depth interviewing" (Patton, 2015, p. 27). This study uses interviews with teachers along with observations in both the professional development (PD) sessions and

the teachers' own classes to chart the connections between the content in PD sessions and teachers' classroom practices. The initial classroom observations occurred before the first PD session to provide a baseline for the study. Observations of the PD sessions helped to create a portrait of the course objectives and concepts emphasized. The bulk of the data in this study is made up of classroom observations conducted at various points throughout the study. Classroom observations were followed up with interviews that probed teachers' thinking. During interviews, teachers were asked to discuss their choices of practices for promoting student self-regulated learning in their own classrooms. Participant journaling was employed for teachers to keep a written record of their experiences. Student indicators of self-regulated learning that originated from the classroom observations were the focus for teachers' reflection on the connections between their own practices and the content presented in the professional development sessions. Teacher artifacts were gathered to glean insight into practices employed for promoting student self-regulated learning. After the end of the professional development series, teachers were asked to describe their experiences within the course and reflect on the content of the course. Teachers' responses and reflections provided the contextual detail that gave greater insight into the way teachers connected with the professional development. Figure 7 outlines the research design.

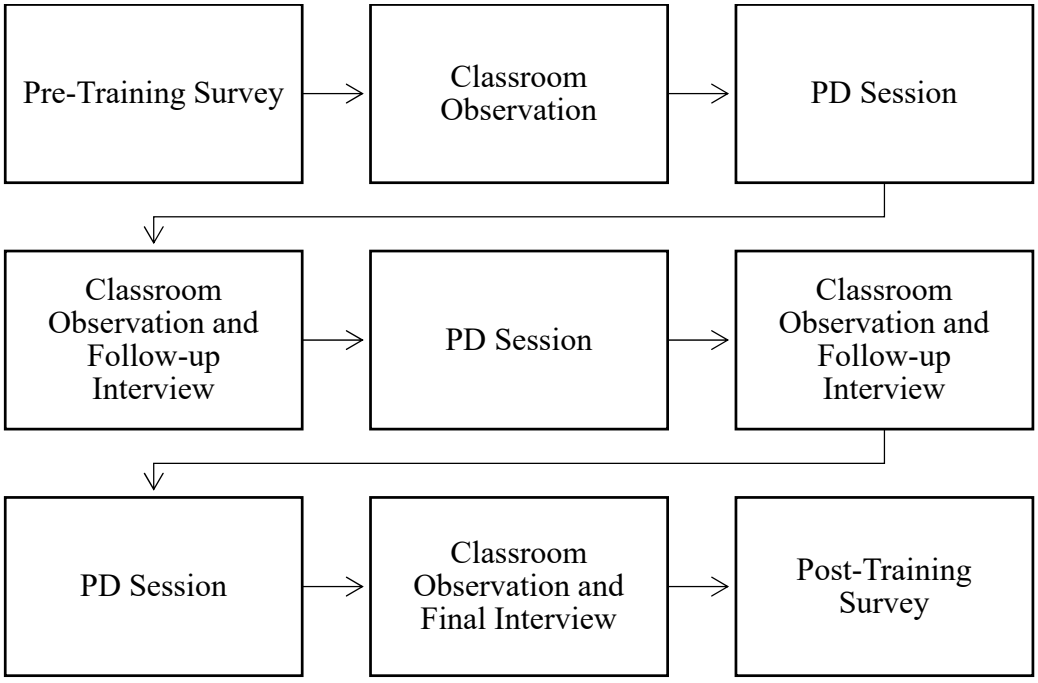

Figure 7. Research Design

Participants

This study took place in a Tennessee Title I rural middle school that serves 302 students in grades five through eight. All students were eligible to participate in an afterschool program. The policies, procedures, and demographics of Big Pine Middle's afterschool program were comparable to the other public-school afterschool programs within its region. All 16 districts within the region received Title I funding. Big Pine Middle's school district was composed of seven rural schools that maintain their own afterschool programs. Each afterschool program operated under the same general guidelines while maintaining flexibility in designing learning experiences for its students.

The participants in this study included the four middle school teachers who served on the math afterschool program team. The researcher presented the action research idea

to the math team and asked each of them to voluntarily participate. All four teachers agreed to be a participant and the researcher also engaged as a participant. Table 8 includes demographics of the teachers in the study. Pseudonyms have been used.

Table 8

Demographics of Participants

Name	Gender	Years of Experience	Primary Subject(s)	Grade
Candace	F	4	Math / Science	5
Mary	F	3	Math / Special	6
James	M	23	Education	7
Luke	M	19	Math Math/Social Studies	8

Data Collection Procedures

At the launch of the study, the researcher met with all four participants on the school campus where the afterschool program takes place. Recruitment protocol is included in Appendix A. Following are steps that were taken to initiate the study:

1. Participants were given a copy of all necessary IRB paperwork, including informed consent forms.
2. A time and place were scheduled for the first PD session.
3. Observation times were scheduled with each participant.
4. Participants completed the pre-training survey.

The purpose of the pre-training survey was for the researcher to gain insight into participants' prior knowledge and current practices involving student self-regulated learning. All participants were also regular school day teachers at Big Pine Middle. Pre-

training survey questions asked of all participants are included in Appendix B. The survey data was recorded on the researcher's password protected computer and coded by the researcher within three days.

After the pre-training survey, the researcher conducted classroom observations of each participant during the afterschool math sessions with students. In conjunction with the pre-training survey, the researcher intended for the initial observation to be a baseline for understanding participants' current practices. An observation checklist was used to gather evidence specific to student self-regulated learning. The same observation checklist was used throughout the study and is included in Appendix C.

Following the initial observation, the researcher engaged participants in a professional development (PD) series over a two-week span that outlined the fundamental principles of student self-regulated learning. The researcher designed the PD series. The Microsoft PowerPoint slides, including notes, are included in Appendix G. The sessions were conducted every other day over the two-week time frame. During each of the three sessions, participants collaboratively developed specific plans to embed student self-regulated learning strategies into afterschool math sessions.

The researcher conducted classroom observations after each PD session and concluded the observations with a follow-up interview. Post observation interview questions are included in Appendix D. The researcher's aim was to gather perception data along with practices participants used to promote self-regulated learning. Immediately following each PD session and during each classroom observation and interview, the researcher recorded fieldnotes which were kept in a locked filing cabinet in

the researcher's afterschool office. Interviews were transcribed within three days of each interview.

Throughout the study, participants maintained a journal of their experiences. At the beginning of the study, the researcher provided participants with journal prompts to aid in their reflection. The prompts were not mandatory, and participants were encouraged to record their experiences about promoting student self-regulated learning throughout the study. Journal prompts provided to participants are included in Appendix E.

At the end of the study, the researcher conducted a final one-on-one interview with participants. Interview questions are included in Appendix F. The researcher's aim was to gather data regarding any possible changes to participants' perceptions and practices because of the student self-regulated learning PD series. The researcher transcribed the interviews within three days of recording and shared the transcription with individual participants to check for accuracy. The final collection of data consisted of participants' responses to the post-training survey. The post-training survey questions were identical to the pre-training survey questions and are included in Appendix B. All files were maintained on the researcher's password protected computer.

Data Analysis Procedures

The analytic process described as follows was based on methods for an action and practitioner research approach informed by Saldaña (2016). The first cycle of coding was in vivo coding in which terms and concepts were drawn from the words of the participants themselves. Survey responses, interview transcripts, observation data, significant data from participant journals, and descriptions of teacher artifacts were all recorded chronologically into Microsoft Word documents. Within the documents, the

researcher generated in vivo codes which were color-coded by participant. In the second cycle of coding, the researcher used pattern coding which groups initial codes into a smaller number of categories. Pattern codes are explanatory and pull together much of the material from first cycle coding into more meaningful units of analysis (Saldaña, 2016). The researcher used Microsoft Word documents containing the chronological in vivo codes to create pattern codes for the purpose of deciphering participants' perceptions and actions throughout the study.

Summary

This action research study was designed to glean evidence regarding the impact of an on-site real-time professional development series on teachers' promotion of student self-regulated learning. Participants were teachers in a rural afterschool setting where eighty-one percent of its students are not proficient in their mathematical understanding. The qualitative research design gathered data from teacher interviews, classroom observations, participant journals, and teacher artifacts. An analysis of the data will be presented in the next chapter.

CHAPTER IV:

PRESENTATION AND ANALYSIS OF DATA

Introduction

This chapter contains an analysis of data collected throughout the professional development series that focused on student self-regulated learning. Data was collected during a two-week period in the month of March 2020. Evidences of teachers' perceptions and practices were gathered through a pre- and post-training survey, three interviews per participant, fieldnotes from four classroom observations per participant, fieldnotes from three professional development sessions, participants' journals, and teacher artifacts. All four teachers who participated were members of the afterschool math team.

The data was documented chronologically according to participant and was categorized by the researcher as perception or practice. A table within a Microsoft Word document was used to classify codes into columns labeled perceptions and practices. Evidences of individual practices were coded from questions three and four of the pre- and post-training surveys; fieldnotes from classroom observations; teacher artifacts; questions two and four of the post observation interviews; questions one, two, and three of the final interview; and participants' specific mentions of practices during professional development sessions and in journal entries. The remaining relevant data not coded as practice was categorized as perception.

Analysis of Findings

The pre-training survey produced the first set of data. The survey, displayed in Appendix B, had four questions. The first two were open-ended questions pertaining to

perceptions about student self-regulated learning and the final two were open-ended questions pertaining to classroom practices used to promote student self-regulated learning. Data generated by the pre-training survey was used to answer the following two research questions:

1. What are afterschool math teachers' perceptions regarding the impact of student self-regulated learning on student academic achievement?
2. What are current practices afterschool math teachers use to promote student self-regulated learning?

Table 9 includes a summary of significant codes captured from the pre-training survey for all four participants that describe perceptions and practices before the professional development sessions convened.

Table 9

Significant Codes from Pre-Training Survey

Participant	Perceptions	Practices
Mary	"students taking control of their own learning"	"creating graph of student progress"
	"makes students want to go further"	"number on the door"
James	"students figure for themselves"	"real-life situations"
	"students must have it"	"brainstorming"
	"essential in all parts of life"	"scenario engagement"

Table 9 cont.

Significant Codes from Pre-Training Survey

Participant	Perceptions	Practices
Candace	"students doing what they're supposed to be doing"	"rules and procedures posted around the room"
	"knowing how to guide themselves"	"afterschool rules"
Luke	"students being aware of the math skills that they need"	"writing the standard in their journals"
	"progress to the next level in their education"	"computer programs"

After participants completed the pre-training survey, the researcher conducted a classroom observation of each participant prior to the first professional development session. Fieldnotes from the observations corroborated the codes generated from the pre-training surveys.

More extensive data was used to answer the final research question. The researcher sought to identify any changes in participants' perceptions and practices relating to student self-regulated learning. The purpose of this study was not to reveal a universal solution but to gather possible evidences of the development of teachers' perceptions and practices through their unique perspectives. Therefore, the following data collections and analyses are organized by participant.

Participant A - Mary

Background

Mary's teaching career began three years ago at Big Pine Middle. She served all three years as the school's mathematics special education teacher with students in grades five, six, seven, and eight. Mary had been a math teacher in the afterschool program for the past two years and had primarily taught sixth graders. She displayed an eagerness at the beginning of this study to participate in the professional development sessions and made an appeal at the conclusion to continue the learning sessions. Mary took notes throughout the PD sessions, asked questions, and made thoughtful contributions to the discussions. During the interviews, she gave extensive and substantive responses and even asked questions that demonstrated a genuine interest in cooperatively working to improve student learning. Although Mary's journal entries were limited in written detail, her interviews indicated thoughtful reflection. During the first interview when asked if she would like to share any other observations or insights, Mary responded:

> I'm so excited to get to work with other people who want to help the kids help themselves. I really don't like doing PDs during the summer because it isn't a good time for me and I don't get to practice it right then. I don't like it either because I don't get to be with the people from my school who know what our school's like. I think the kids who come to afterschool are the ones who can learn from this because they feel more comfortable asking us stuff here but not so much in the day classes. And I think this is the perfect place for us teachers to learn new stuff too. So, in a way I guess we're learning to self-regulate our learning too.

Descriptive information contained in the researcher's fieldnotes revealed that during the PD sessions, Mary praised other participants' current practices and offered ideas to enhance them. Fieldnotes describe instances of participants' positive reception and implementation of Mary's suggestions.

Perceptions of Student Self-Regulated Learning

In the pre training survey, Mary broadly described student self-regulated learning as "students taking control of their own learning." She placed a high value on the impact of student self-regulated learning and noted that "it makes students want to go further." During the first classroom observation which occurred before the PD sessions, Mary demonstrated a high priority for student learning for all. She promptly began her lesson and ensured all students had completed their work and had an opportunity to ask her questions.

During the first PD session, Mary's comments illustrated that she was beginning to think more deeply about student self-regulated learning. She admitted, "I never really thought about it as being planned to reach a goal. . . but more like you got it or you don't." In the second classroom observation Mary told the students, "You're going to notice us changing some things around so you can have a chance to learn how to help yourself learn which you'll use your whole life." At that point she began her quest to help students help themselves. During the next two PD sessions, classroom observations, and interviews, her perceptions of student self-regulated learning transformed from broad explanations to a more focused analysis. In Mary's post-training survey, she described student self-regulated learning as "specific ways students manage their learning inside a

cycle – setting goals, knowing what strategies to use to monitor yourself, and reflecting on what you learned."

Classroom Practices Promoting Student Self-Regulated Learning

In the pre training classroom observation, Mary's classroom practices revolved around student learning but with much assistance from her. She reviewed each student's homework to ensure they had the correct answers. At one point in the observation, three students from other classrooms came for Mary's assistance. She congenially assisted the students and encouraged them to "keep up the good work." However, throughout the first observation there was no evidence that Mary was promoting self-regulated learning.

As Mary actively participated in the PD sessions, she discovered specific actions she could take to assist students in regulating their own learning. In her journal, she recorded notes and ideas about classroom practices she could immediately begin implementing. In one journal entry, Mary wrote a list of reminders for herself: "guide - don't do; be a model – say it out loud; talk about learning – not about grades; make them explain – ask good questions; give ideas where to go for help- don't assume they know; write every day in a journal – give them prompts." Data from the last two classroom observations describe Mary explicitly discussing learning goals, asking probing questions, and dedicating class time for reflection. In the last two interviews, she displayed a resilient attitude through insights such as "that's not how I wanted it to go. . . but I can't expect them to get it right away so I'll try again tomorrow." Mary was learning to refine her practices to best suit the needs of her students.

Summary

Table 10 includes a summary of significant codes captured from Mary's data along with the researcher's interpretations.

Table 10

Summary for Participant A - Mary

Second Cycle Pattern Codes	Participant Quotes	Researcher's Interpretive Summary
General	"students taking control of their own learning" "Let's make sure everybody makes at least a 70." "Which two choices could it be?" "I never really thought of it being planned."	Mary began this study with a *loose* understanding of what student self-regulated learning is and what classroom practices to use to promote it. She focused more on performance rather than learning goals and asked *general* questions. Through her reflections and self-evaluations, her thinking began to transform.
Specific	"Today I want us to make sure we understand what we are doing and if we don't understand, we need to pause and get some help. Let's talk about where we'll go for help…" "The first step for me to take in my classroom is to talk about self-regulated learning to the kids so they don't depend so much on me." "Sharing the learning goal today gave them a model of how they can set goals." "What is another way you could solve this problem?"	Mary's perceptions and practices became *tighter* during the study. Her plans to teach students specific self-regulated learning strategies became more intentional by the end. She broke down the strategies into understandable chunks for students and was consistent in applying the practices every day. Having Zimmerman's model to follow helped Mary be more *specific* in teaching students self-regulated learning

Table 10 cont.

Summary for Participant A - Mary

Second Cycle Pattern Codes	Participant Quotes	Researcher's Interpretive Summary
Specific	"In your journal, write about what you did today to help yourself learn more about dividing a fraction by a fraction." "After this PD I am going to make sure I always help students set goals and have chances to help themselves while they learn and then think about what they did and what they learned at the end. But I think we need to do this more in afterschool to work together and do this together so we'll stick to it."	strategies. She realized the importance of implementing and practicing the strategies over a time span reaching well beyond the scope of this study.

Participant B - James

Background

James had been teaching at Big Pine Middle for the past nineteen years of his twenty-three-year teaching career. His expertise in mathematics influenced his teaching assignments to vary among grades five through eight. His current assignment was math interventionist for all students in grades five through eight. He had been a teacher in Big Pine Middle's's afterschool program for the past five years and had been mainly assigned to teaching seventh grade math. At the beginning of the study, he was dispassionate about participating but stated that he would "like to get to talk to other afterschool teachers about math." During the first classroom observation, James told the students:

> You guys are going to get some extra help from us these next couple of weeks in math. It's real important for math in the real world that you know how to figure

> for yourself because somebody else won't always be there to bail you out. You need to take this serious and think about what all you've learned over the last years and put it all together.

As students were leaving the classroom, James told the researcher:

> Kids don't think like they used to. This common core stuff just makes them shut down when they don't get it. It's a good idea to challenge them but they don't even know where to start. They don't know how to think.

James' frustration indicated a lack of understanding regarding a teacher's role in developing self-regulated learners. Similar candid comments made by James during the PD sessions helped clarify the importance of teachers' contributions to student self-regulated learning.

Perceptions of Student Self-Regulated Learning

"Students figuring for themselves" was James' response to the pre-training survey question asking him to describe what student self-regulated learning in a math classroom looks like. At the beginning of the first PD session, he bluntly stated that "you hardly ever see a self-regulated student." Furthermore, in response to Mary's comment that "I never really thought about it [student self-regulated learning] as being planned to reach a goal… but more like you got it or you don't," James responded:

> That's right. They have it or they don't. By the time they get to us they've either learned to think for themselves or not. They've figured out by now what buddy to go to who'll help them out.

Another participant, Luke, then rhetorically asked, "But don't we want them all or at least most of them to leave our school having this skill?" This exchange served as a reference

point throughout the remainder of the first PD session. Through the team's discussion, each team member was beginning to understand the importance of helping students understand how to self-regulate their learning. Because of James, team members also began to realize that self-regulated learning could effectively be taught explicitly by using Zimmerman's model. After the researcher introduced the PowerPoint slide with Zimmerman's model, James sketched the model on a large whiteboard and led the team discussion. He said, "We can change forethought to goal stage, performance to doing the math stage, and self-reflection to reflection stage." Other participants added to the discussion by explaining how teachers can start a dialogue about why learning goals are posted, why questioning is used, and why exit tickets are required. James extended the team discussion by sketching a math problem on the board along with a learning goal, set of probing questions, and reflection prompt. He said, "We just need to tell them why we set up the math like this so they can be learning how to do it." At the end of the session, James commented, "I think we can teach them this if we break it down like we do math problems."

In the second PD session, James offered helpful insights about facilitating math discussions in the classroom. He said:

> I like to use quality real-life problems that the kids can relate to. I use one main problem in each lesson. If it's a good one, the kids can talk about it and talk about what they're thinking and all the different ways they can work it out. Then I can tell who knows how to regulate and who doesn't and who needs help.

James was referring to his math class during school hours. During the initial afterschool classroom observation in this study, James did not permit students to talk. Rather,

students were given a set amount of time to independently complete a worksheet and "just hang on to it." During the second observation, James had posted on the board the learning goal, a real-world problem, and a sketch of Zimmerman's model. Students were working together and were engaged in meaningful math discussions. During the last post-observation interview, James shared:

> I'm beginning to like doing this self-regulated stuff in afterschool along with a real-life problem. I've not been doing so much problem work in afterschool because they're just done by the end of the day. But when we put in the goals and discussions and questions and places they go for help without me telling them, they just run with it. They like me out of the picture (laughs). You saw today's lesson. . .they really wanted to be the one to get the closest number of pennies that fit in that circle. I can tell they're getting surface area from watching them and listening to them. I did this same problem with my seventh graders [during the school day] last year, but these guys seem to be getting more out of it. Probably because I'm spending more time talking about self-regulation than telling them what math step to take next.

In James' post-training survey, he wrote that student self-regulated learning "makes the teacher the facilitator and the student the one who shows and explains what they know."

Classroom Practices Promoting Student Self-Regulated Learning

During the pre-training classroom observation, the researcher saw no evidence of practices James used to promote student self-regulated learning. In the second classroom observation, James spent a large portion of the class time discussing and working with learning goals. In the third classroom observation, he had posted on the board learning

goals and a real-world problem which students were discussing in small groups. During the final classroom observation, students were reflecting on their previous work from the real-world problem and were considering other methods that could be used to solve the problem. In his journal, James documented plans to continue embedding self-regulated practices along with real-world problems. In one entry he wrote, "last lesson – cylinders activity - have students reflect on relationship between volume and surface area." In the final interview, James explained that he had "a lot of go-to deep-thinking problems" readily available for all standards but had not "put in self-regulated strategies when teaching them until now."

Summary

Table 11 includes a summary of significant codes captured from James' data along with the researcher's interpretations.

Table 11

Summary for Participant B - James

Second Cycle Pattern Codes	Participant Quotes	Researcher's Interpretive Summary
Abstract	"students figure for themselves" "brainstorming" "scenario engagement" ". . . you're gonna work on some decimals" "Real-world problems help you apply all the math you know – not just what we're working on now."	Before this PD series, James *conjectured* that student self-regulated learning is a self-developed trait acquired through applying math principles in real-world situations. His thoughts and classroom practices were *abstract*.

Table 11 cont.

Summary for Participant B - James

Second Cycle Pattern Codes	Participant Quotes	Researcher's Interpretive Summary
Concrete	"Before we get started on the problem, let's talk about the exact math we'll be using and where we can go in case we forgot." "You've seen the problem we'll be working. Now let's come up with a learning goal, instead of me just writing it, and then we'll start." "So yesterday when you worked this problem, I need you to think about that, and write down by yourself… look up here on the board… what was hard for you, what was easy, what math you used, where you went for help, and what goal you have for getting better at converting fractions to decimals." "I like this [teaching self-regulated learning]. It's how math teachers think – in steps. . . it makes sense." "The thing that surprised me most about this PD is that doing the self-regulated steps with the lesson helped me see what they're not understanding so I can help them better."	By the end of the PD series, James began to articulate his thoughts about student self-regulated learning more *clearly*. He also began to implement *concrete* strategies to help students develop self-regulated learning skills. During the PD series, James witnessed the positive changes in students' mathematical understanding because of his deliberate promotion of self-regulated learning.

Participant C - Candace

Background

Candace had been teaching for four years at the time of this study. She began her employment with Big Pine Middle as an educational assistant. After one year as an

assistant, she was hired as a fifth-grade science teacher and kept that position for three years. In the fourth year, Candace taught both math and science to fifth graders. She had been a math teacher in the afterschool program for the past three years and had primarily taught fifth graders. Candace displayed signs of insecurity during the first PD session when she stated:

> You all know I don't know anything about math so don't expect a lot out of me. I've just been treading water all year long and hoping I'm not hurting my kids too bad. I'll try anything you all tell me to. . .I'm desperate.

After Candace's statement, Mary disagreed and said, "I've been in your classroom and have seen a lot of good things so don't even go there." Even though Candace seemed unsure of herself, she was comfortable in sharing her thoughts and feelings with the math team. She also responded to every non-mandatory journal prompt the researcher provided. In her first journal entry Candace wrote:

> I want to take away from this professional development ways I can be a better math teacher. I want to be able to talk about math with adults and know what I'm talking about. I want to know how to help the students when I don't always know it perfectly myself. I want to be as good at teaching math as teaching science.

The researcher noted during the first classroom observation that Candace was exceptionally detail-oriented regarding classroom procedures. Procedures were posted on the walls as reminders to students and ranged from turning in homework to getting a tissue. The afterschool students followed the procedures nonchalantly. In her four years of teaching, Candace had created an organized and productive atmosphere.

Perceptions of Student Self-Regulated Learning

In the pre-training survey, Candace described student self-regulated learning as "students doing what they're supposed to be doing and knowing how to guide themselves." Candace's main interest in the first PD session was goal setting. During discussion of the forethought phase in Zimmerman's model, Candace shared:

> I think that's right about learning goals. A lot of times we focus too much on grades. The kids are on different levels. We need to teach them not to compare themselves to their friends because they won't learn that way. . .they'll just copy off who they think's the smartest.

As the team began to discuss effective ways of articulating learning goals, Candace stated:

> I already share the lesson goals with them. . .there's a place on my front board that I post them every day. But the kids need to be buying into it and me not being the only one setting the goals. So I probably need to set up a system for them to have a folder or something where they write my goal from the board and then add theirs underneath.

In a journal entry after the first PD session, Candace wrote, "The most important thing I learned today is that my students need to be more involved in setting goals that are about learning and not so much about grades."

Classroom Practices Promoting Student Self-Regulated Learning

In the pre-training survey, Candace described her current practices to promote self-regulated learning as "rules and procedures posted around the room to help them

remember what to do without asking me." In the first post observation interview, the researcher asked how she thought the lesson went, and Candace replied:

> You saw where I added a section on the board under the lesson objectives that tells them to write it in their journal and then add their own goals to it. Their minds were blown. They didn't even know what fluently means much less write a goal about it. So the lesson didn't go so well because we got stuck at the beginning.

When the researcher pointed out that at the end of class students were already setting goals for the next day, Candace retorted, "that's because I helped them through it and explained it." The researcher responded, "Isn't that what we want to be doing… giving them supports to be self-regulated learners?" Candace replied, "Yeah, I guess everything went okay after all." She then reviewed the journals of the ten students and found that all of them had written thoughtful learning goals. Candace seemed to be encouraged by the evidence.

Candace's confidence seemed to continue to rise throughout the second PD session. The team discussed Zimmerman's performance phase in which teachers prompt discussions about self-regulated learning and where students can go for help. When Luke prompted a discussion about credible websites students could use as a learning tool, Candace responded:

> This makes me feel good. It's like I don't have to know it all. I don't have to be the expert in the room. I use those websites all the time. . .I don't know what I would have done without them. . .not knowing a lot about math. But what I

should have been doing all along is telling the kids about them and they could have probably even learned better that way.

In one of Candace's final journal entries, she wrote, "The main thing I will change in my classroom is not having so many required procedures but getting my students more involved in their own learning procedures." During the final interview, Candace commented that the PD sessions were "very helpful but not long enough." She hoped that the school's administration would support a similar PD series for the regular school day because student self-regulated learning "is what will carry students through the rest of their schooling."

Summary

Table 12 includes a summary of significant codes captured from Candace's data along with the researcher's interpretations.

Table 12

Summary for Participant C - Candace

Second Cycle Pattern Codes	Participant Quotes	Researcher's Interpretive Summary
Focus on Procedures	"don't expect a lot out of me… I'll try anything you all tell me to" "doing what they're supposed to be doing" "What does the sign say you do when you get finished early?"	At the beginning of this action research study, Candace seemed unsure of her abilities to teach math and attempted to compensate for her insecurities by *focusing on procedures.*

Table 12 cont.

Summary for Participant C - Candace

Second Cycle Pattern Codes	Participant Quotes	Researcher's Interpretive Summary
	"Today we're going to review multiplying multi-digit numbers, then practice, then have some free time." "Have you followed the rules?"	
Focus on Learning	"When we set goals, we want to make sure they are about learning." "Always make your goals about what you need to learn, not what your neighbor needs to learn." "Can you share with the class where you went to figure that out?" "How can you know if you've learned today's objective?" "As you do your assignment today, write down all the problems that you had trouble with, and we'll figure out together the best places to go for help." "Teaching self-regulated learning is as important as teaching the subject." "The biggest reward for teachers is seeing students be able to do it on their own. The biggest reward for students is learning more and learning self-confidence."	Throughout the study, Candace's confidence seemed to improve as she began to focus on *student learning* rather than on developing and enforcing stringent procedures. She began facilitating instead of trying to be an expert. She shifted from a procedures-driven environment to one of helping students develop goals, search reliable sources for help, engage in meaningful discussions, and reflect on what they had learned.

Participant D - Luke

Background

At the time of this study, Luke was in his nineteenth year of teaching and had served all nineteen at Big Pine Middle. Over the years his teaching assignments were in sixth and eighth grade math and social studies. He had been assigned to eighth grade social studies during this study. In the afterschool program, Luke had been working as a math teacher for the past five years. He was the afterschool math team leader ensuring that all math teachers had the necessary support and resources for delivering relevant and high-quality math lessons. His emphasis had been on computer-based lessons since each student had been issued a Chromebook in the previous two years. At the recruitment meeting, Luke shared his thoughts about lesson planning with the afterschool math team. He said:

> I'm glad we're doing this together. We need some time to work out how to change up things. The kids have been complaining about the lessons we're making them do on the Chromebooks and I don't know why. If I had that when I was a kid I would have loved it like that instead of pages and pages of working out math.

When Mary asked Luke if he thought the team needed to revert to paper assignments, he responded:

> No, I think we definitely need to use the Chromebooks but the kids need to know how to use them for learning. I'm tired of them complaining about having to do work and not getting to play [computer] games. I have to guide them through every step of the problem no matter if it's on Study Island or Khan or whatever. . .

but they don't seem to have a problem figuring out how to play the games. Maybe us looking at ways to help them self-regulate will help.

Perceptions of Student Self-Regulated Learning

In the pre-training survey, Luke described self-regulated learning as "students being aware of the math skills that they need to attain to progress to the next level in their education and researching and practicing those skills until they have attained mastery." He went on to write, "I believe that self-regulated learning is the most determining factor for students' academic achievement in mathematics." During the first PD session, Luke suggested ways teachers should communicate learning goals to students. He said:

> The learning goals should be the standards. I always have them write the standard in a book they make so they can keep track of what they need to be practicing.

During the classroom observation following the first PD session, the researcher observed students copying a math standard from the board and then beginning the computer assignment written underneath the standard. Students closed their notebooks and did not refer to it for the remainder of the class. In the follow-up interview, Luke stated he saw no evidence that students fully understood the mathematical concept of comparing proportional relationships. He explained:

> They are writing the standard that I give them and they are doing a lesson about the standard, but they aren't connecting them. It may be because I'm telling them what to write and they're just writing and not thinking.

When asked what future changes could be made to get students to think, Luke replied:

> They need to be understanding the goals. We were talking about breaking down [in the first PD session] and these standards need breaking down. In tomorrow's

> class I could give them the standard and then we could break it down and make a goal to work on in the class. We could try that. I need to stop doing it all and they need to start doing the thinking. . . not just me.

In a journal entry near the end of the study, Luke wrote, "I have learned that I have been doing all the work and that I need to be guiding, not doing the thinking for them."

Classroom Practices Promoting Student Self-Regulated Learning

In the pre-training survey, Luke revealed that he uses "computer programs to promote student self-regulation." The first two classroom observations were similar with students writing a standard in their notebooks and then completing computer assignments. In the second PD session, Luke's lesson planning began to transform. He said:

> I think the missing link, at least for me, has been that they aren't explaining. They just go through the motions and I don't let them talk it out. I've been answering all their questions instead of them figuring it out together. I should've been asking them a question back.

Candace asked, " How will we get them to explain on a computer?" Luke suggested:

> We could break down the assignment into chunks so they have the chance to look at what they missed and write about it or talk about it and go to another source for help if they need it and then go on to the next section and so on. Then when they are done they can use the computer report we pull and tell why or why not they understand.

The final classroom observation revealed the new practices Luke had envisioned. At the beginning of class, students wrote the standard for the lesson in their journals.

Immediately following, Luke facilitated a class discussion to break down the standard into main ideas that prompted learning goals. Once students wrote individual learning goals underneath the standard, they worked a warmup problem in pairs and explained their reasoning to the class. Luke then prompted a discussion about reliable sources students could use for help. Next, students completed the first half of the assignment, paused to discuss with a partner and write about their learning, and then completed the remainder of the assignment. At the end, students were responsible for using the computer-generated report to write about their progress in their journal. In the final interview, Luke said:

> I have moved from big chief to little chief. They aren't depending on me to answer for them and aren't complaining as much as they used to. I think they are seeing how the computer. . . I mean it's feedback. . . can actually help them learn and know what to do to do better.

Summary

Table 13 includes a summary of significant codes captured from Luke's data along with the researcher's interpretations.

Table 13

Summary for Participant D - Luke

Second Cycle Pattern Codes	Participant Quotes	Researcher's Interpretive Summary
Teacher-centered	"Write down the standard I wrote on the board." "Did I say for you to go there for help?" "Why didn't you ask me?" "I have to guide them through every step of the problem." "After you finish the assignment, come up here and I'll tell you what I want you to do next."	From the beginning, Luke realized the importance of student self-regulated learning but placed much emphasis on the *teacher as disseminator.*
Student-centered	"What is an example of a learning goal you might have for this standard?" "Where could you go to get help for knowing if it's a proportion or not?" "Do you and your partner have to have the same learning goal? Why?" "What computer program could we use to help you learn this standard the best?" "Students are more motivated when they have a part in the goals and lessons." "It takes a lot of time to get them to be the ones who are thinking but we're not in a race."	Luke began to transform his classes from *teacher-centered to student-centered* as he witnessed positive changes in his students while adjusting his practices. He stopped telling students what they would be learning and started involving students in the planning and learning process. Through the real-time application of new or modified practices, he was surprised to learn that some of his previous classroom practices were not productive in promoting self-regulated learning.

Second Cycle Pattern Codes	Participant Quotes	Researcher's Interpretive Summary
Student-centered	"Students need to be involved in lesson planning… at least in afterschool… because we're here to help them catch up and then maybe get ahead." "I thought I had this down pat but I found out different."	

Pre- Survey to Post Survey Changes

Participants completed a pre-training survey and a post-training survey that contained identical questions. Responses from the surveys were compared to identify possible changes in participants' perceptions and practices. In addition, the researcher identified correlations between participant responses and Zimmerman's research as outlined in Table 5. Zimmerman's compiled list of categories and strategies is a result of studies of students who practice self-regulated learning. Pre- and post-training survey data for Participant A (Mary) along with connections to Zimmerman's research is recorded in Table 14.

Table 14

Participant A (Mary) Evidence Table Pre and Post Survey

Pre-Training Survey Excerpts	Post-Training Survey Excerpts	Zimmerman's Categories/Strategies
"Self-regulated learning is where you see students taking control of their own learning."	"A self-regulated learner has self-awareness. They are aware of the best way to set goals for themselves.	Self-evaluating Goal-setting and planning

Table 14 cont.

Participant A (Mary) Evidence Table Pre and Post Survey

Pre-Training Survey Excerpts	Post-Training Survey Excerpts	Zimmerman's Categories/Strategies
"I create a graph of student progress throughout the year. I make a bulletin board out of my outside door to put what students have learned and what they still need to learn."	They are aware when they don't understand and need to change what they're doing. They are aware that they need to reflect or think about what they've learned so they can learn more." "I now explain to the kids how to be a self-regulated learner and why it's important. I ask thinking questions while they're learning and give them prompts to write at the end so their learning will last."	Seeking information Keeping records and monitoring Reviewing records

Mary's understanding that a self-regulated learner is self-aware coincides with Zimmerman's research that self-evaluation and goal setting are indicators of self-regulated learning. Table 15 includes data from Participant B (James).

Table 15

Participant B (James) Evidence Table Pre and Post Survey

Pre-Training Survey Excerpts	Post-Training Survey Excerpts	Zimmerman's Categories/Strategies
"Self-regulated learning in a math class is when the students figure for themselves."	"A self-regulated math student is one that knows what to do before, during, and after they solve	Organizing and Transforming

Table 15 cont.

Participant B (James) Evidence Table Pre and Post Survey

Pre-Training Survey Excerpts	Post-Training Survey Excerpts	Zimmerman's Categories/Strategies
"I give students real-life situations where they must think for themselves and apply it to everyday, real-world actions."	problems. They are confident. They plan what they're going to do before they do it, they self-correct during, and they reason about it at the end."	Self-evaluating Goal-setting and planning Seeking information
	"I give students real-life problems and start discussions about how to be self-regulated learners and how they'll use it even when they're out of school. We talk about good math goals and effective strategies. I require them to write about their learning."	Reviewing records Environmental structuring

James' perception of student self-regulated learning at the end of the study connects to Zimmerman's model of self-regulated learning as well as several items in Zimmerman's compilation of categories and strategies. Table 16 illustrates connections for Participant C (Candace).

Table 16

Participant C (Candace) Evidence Table Pre and Post Survey

Pre-Training Survey Excerpts	Post-Training Survey Excerpts	Zimmerman's Categories/Strategies
"I would see students doing what they're supposed to be doing and asking questions to want to learn more. Students would be knowing how to guide themselves."	"When I see student self-regulated learning, I see students who are making goals, correcting their own learning, and thinking about what they learned. I see happy students."	Organizing and transforming Self-evaluating Goal-setting and planning Seeking information
"I have rules and procedures posted around the room to help them remember what to do without asking me."	"I know how to teach students the difference in performance and learning goals. I ask more questions about what they're thinking. I have reflection journals for them to record their learning."	Reviewing records Keeping records and monitoring

Candace's adoption of perceptions and practices that focus on student learning correlates with Zimmerman's research suggesting students who organize and transform their learning are more apt to self-regulate their learning. Table 17 includes a summary for Participant D (Luke).

Table 17

Participant D (Luke) Evidence Table Pre and Post Survey

Pre-Training Survey Excerpts	Post-Training Survey Excerpts	Zimmerman's Categories/Strategies
"Students being aware of the math skills that they need to attain to progress to the next level in their education and researching and practicing those skills until they have attained mastery."	"It is when students are setting goals, monitoring their learning, and reflecting on what they learn. It is what they need to know for the rest of their lives."	Goal-setting and planning Self-evaluating Seeking information Organizing and transforming
"I currently use computer programs such as IXL and Study Island to promote self-regulation."	"I have students identify the areas they need to strengthen by looking at and studying what they missed from the computer reports. Mostly I have students think about thinking – and write about it."	Keeping records and monitoring Reviewing records

Luke extended his classroom practices from solely relying on the use of computer programs to promote self-regulated learning to teaching students to review the data generated from the computer programs and follow up with an action plan. Luke's practices relate to Zimmerman's research which describes self-regulated learners as those who review their own work, self-evaluate, and transform their learning process.

Overall Summary

Data gathered from the pre-training survey and from the first classroom observation of all four participants was used to provide insight into each participant's unique perceptions and practices prior to the professional development series. Subsequent data gathered from interviews, classroom observation fieldnotes, professional

development fieldnotes, participants' journals, teacher artifacts, and surveys were arranged and analyzed chronologically by individual participant to identify possible changes. The qualitative data reveal that a change did occur in each participant's perceptions and practices used to promote student self-regulated learning. Further discussion of the findings, conclusions from the study, implications for practice, and recommendations for future research are discussed in Chapter V.

CHAPTER V:

DISCUSSION AND CONCLUSIONS

Introduction

This study was abbreviated due to the COVID-19 pandemic. The researcher's initial aim was to conduct the study throughout the last semester of the school year. However, due to school closures, participant collaboration was limited to a two-week time frame. During the study, the researcher led the professional development sessions, observed participants' classroom practices, conducted participant interviews, and administered surveys. The researcher gathered extensive data over the two weeks but was unable to follow through with the study by continuing the team's work and by involving more participants. Therefore, the following discussion is limited to the results of the two-week study involving four participants.

Discussion of Findings

All four math teachers in the Big Pine Middle afterschool program were willing to make necessary changes that would equip students with lifelong learning skills. The researcher designed a two-week professional development series for the team to study and embed strategies to promote student self-regulated learning. To monitor the team's progress, three research questions were considered.

Research Questions 1 and 2

What are afterschool math teachers' perceptions regarding the impact of student self-regulated learning on student academic achievement? What are current practices afterschool math teachers use to promote student self-regulated learning?

The purpose of the first two research questions was to gather evidence of participants' perceptions and practices prior to the professional development series. The researcher analyzed data from the pre-training survey and from pre-training classroom observations. Table 18 includes the researcher's interpretation of the data generated prior to the professional development series.

Table 18

Interpretation of Data Generated for Research Questions 1 and 2

Participant	Perceptions	Practices
Mary	Mary broadly described student self-regulated learning as "students taking control of their own learning." She placed a high value on the impact of student self-regulated learning and noted that "it makes students want to go further."	Mary's classroom practices revolved around the promotion of student performance rather than student learning.
James	James described student self-regulated learning as an essential self-developed trait in which "students figure for themselves."	James' examples of classroom practices used to promote self-regulated learning included abstract ideas such as "brainstorming" and "scenario engagement."
Candace	Candace understood self-regulated learning to be "students doing what they're supposed to be doing and knowing how to guide themselves."	Candace believed her "rules and procedures posted around the room" would promote self-regulated learning.

Table 18 cont.

Interpretation of Data Generated for Research Questions 1 and 2

Participant	Perceptions	Practices
Luke	Luke thought of self-regulated learning as "students being aware of the math skills that they need" to be able to "progress to the next level in their education."	Luke's practices included directing students to write "the standard in their journals" and using assigned computer programs to advance student self-regulated learning.

Research Question 3

After engaging in a professional development series on self-regulated learning, how do afterschool math teachers change (a) their perceptions regarding the impact of self-regulated learning and (b) their practices used to promote student self-regulated learning?

After engaging in a collaborative professional development series studying student self-regulated learning, data suggests that participants' perceptions and classroom practices evolved. Qualitative data demonstrate varying effects on each participant. Table 19 contains the researcher's synopsis of noteworthy changes in participants' perceptions and practices evidenced throughout the study.

Table 19

Overall Summary of Participant Changes

Participant	Researcher's Interpretive Summary of Changes in Participants' Perceptions	Researcher's Interpretive Summary of Changes in Participants' Practices
Mary	Mary's ideas about self-regulated learning progressed from general to specific. She went from an awareness of student self-regulated learning to a belief that regulating one's own learning is the foundation for lifelong learning.	Mary's practices evolved from compiling and displaying general data to providing specific supports that guide students to take control of their own learning.
James	James' thinking that self-regulated learning is a trait that one possesses changed to a belief that students can be taught how to regulate their own learning.	James began intentionally and explicitly teaching students to self-regulate their own learning. He blended self-regulated learning skills with math skills to promote a deeper understanding of the content.
Candace	Candace's perception of student self-regulated learning reshaped from compliance-driven to learning-driven. She began to focus on the student's role in self-regulating their own learning rather than on mandated procedures to force self-regulation.	Candace moved from enforcing procedures to explicitly teaching self-regulated learning processes, soliciting student input, and promoting mathematical critical thinking.

Table 19 cont.

Overall Summary of Participant Changes

Participant	Researcher's Interpretive Summary of Changes in Participants' Perceptions	Researcher's Interpretive Summary of Changes in Participants' Practices
Luke	At the beginning, Luke realized the importance of student self-regulated learning but emphasized the importance of teachers giving students opportunities to learn to self-regulate on their own through computer programs. At the end, Luke realized that students need guidance and support from the teacher in applying the principles of self-regulated learning.	Luke shifted from a teacher-centered to a learner-centered environment. He creatively enhanced familiar classroom practices to further develop students' self-regulated learning. He began to incorporate classroom practices that encourage students to think about their own learning.

All four participants were more articulate in describing and explaining their unique perceptions of student self-regulated learning at the end of the PD series than they were at the beginning of the series. Mary fluently outlined the phases of self-regulated learning, James described the essential role that teachers play in promoting self-regulated learning, Candace explained the importance of teachers allowing students to understand and practice self-regulated learning, and Luke simplified the complexities of self-regulated learning.

Throughout the study, Mary's perceptions and practices began to evolve from an awareness of student self-regulated learning to an intentional effort to equip students with necessary and specific skills to become self-regulated learners. However, she realized that developing students' self-regulated learning would take time. She stated, "I'm lucky

I've got these students for one to three more years because this is gonna take some time to get better at on my part and theirs." In the last two interviews, she displayed a resilient attitude through insights such as "that's not how I wanted it to go. . .but I can't expect them to get it right away so I'll try again tomorrow." Mary was learning to refine her practices to best suit the needs of her students. Mary's commitment to supporting students in regulating their own learning was evident in her words and actions.

James' bleak attitude in the beginning transformed to one of hope as students positively reacted to his specific guidance during the study. When asked what practices he might maintain after the PD series, James replied, "I'm going to talk about regulation skills and show it and be more clear in the future. . . I forget that middle schoolers need that as much as the little guys. . . especially in math." As he shared his experiences of teaching self-regulated learning with the math team, he demonstrated the utility of teaching students lifelong learning skills along with valuable content knowledge. In addition to sharing his classroom successes with the math team, James also assumed a leadership role during the PD sessions. He emphasized mathematical content connections among grade levels and demonstrated how to fluidly incorporate Zimmerman's processes of learning into specific math lessons. At the end of the PD series, James said, "We need to keep this up. . . our kids need this."

Candace's strong work ethic and desire to grow professionally were evident throughout this action research study. She was a major contributor in finding pathways for the team to promote self-regulated learning in afterschool sessions. Her mindset began to change from one of having sole responsibility for student learning to one of sharing responsibility. Candace's willingness to modify her procedures-based practices

served as a strong example for the entire math team to embrace a focus on student learning.

Luke strengthened his leadership abilities throughout the study as he guided the math team in incorporating student self-regulated learning strategies into high-quality computer-based math lessons. He designed a simple lesson planning process that includes explicitly teaching self-regulated learning when using computer programs. Luke regularly reminded both teachers and students to "keep it simple – focus on the three stages." His cues to use Zimmerman's three-phased model enhanced the palatability of teaching and practicing self-regulated learning using any mode of content delivery.

Throughout the study each participant maintained their overall teaching style while embedding explicit self-regulated learning opportunities. However, they adapted their perceptions and practices to be more definite and intentional in the promotion of self-regulated learning. Taking a holistic approach to answering the research questions, the researcher described the unique transformation of each participant. Figure 8 describes the advancement of each participant's perceptions and practices during the study.

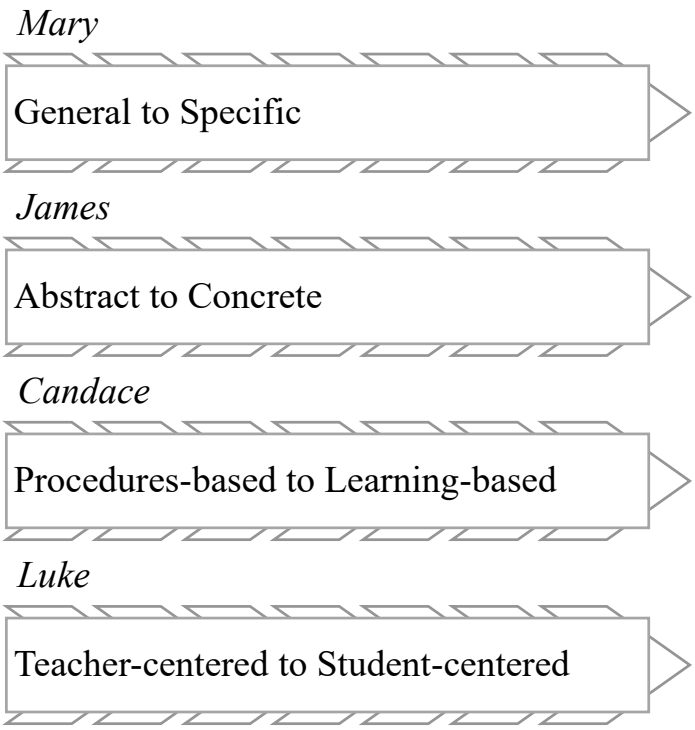

Figure 8. Changes in Participants' Perceptions and Practices

Conclusions

While each participant began to reshape their unique perceptions and practices during this abbreviated study, an analysis of the data uncovered overlaps in participants' responses to the study. Figure 9 captures the three main conclusions that resulted from this study.

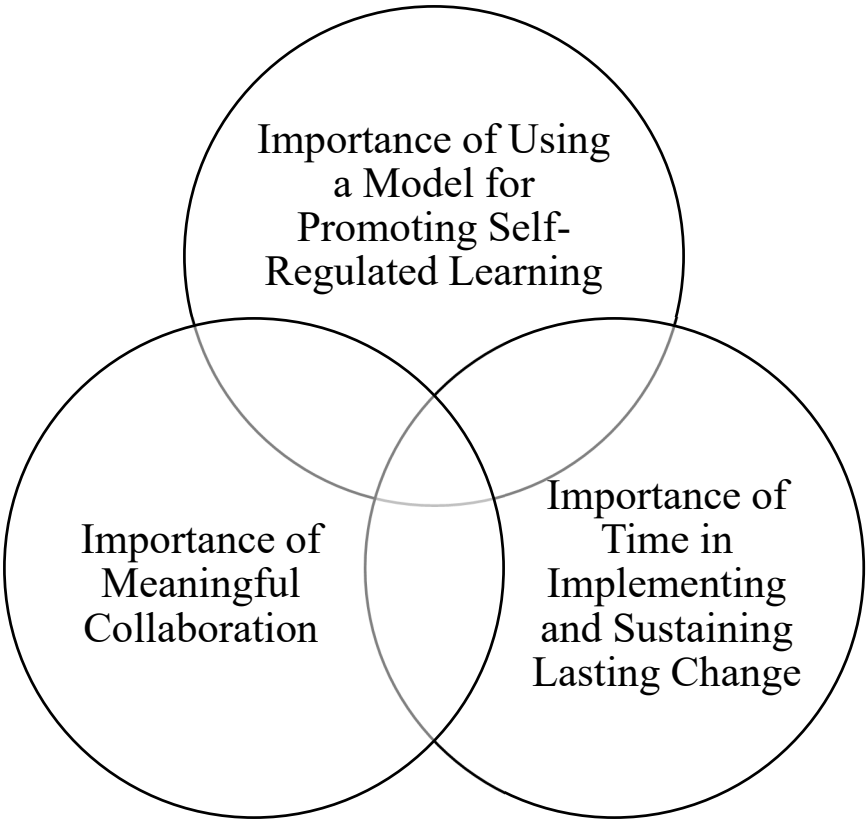

Figure 9. Conclusions of the Study

Three main conclusions that emerged from participants' common viewpoints are as follows. (1) Meaningful collaboration is important in improving both student and teacher learning. (2) Using a model to explain student self-regulated learning is important for effective implementation. (3) Implementing and sustaining lasting change requires time. These conclusions are further discussed below.

Meaningful Collaboration is Important in Improving Both Student and Teacher Learning

Collaborative opportunities for teachers at Big Pine Middle are limited. This study revealed that all four participants appreciate the opportunity to work together with a

common goal. Mary said, “This was really helpful for us to get together and work on something besides getting the kids ready for TCAP.” “Helping them with real-life skills is really what it’s all about,” added Candace. James said, “I like us talking about the math and how to help them help themselves.” “It takes us all working on it together,” shared Luke.

Collaborative learning that is needs-driven and applied in a real-time environment has potential in navigating change for improvement. This action research study was designed as a team effort in studying and promoting student self-regulated learning. Smith and Gillespie (2007) found that working together with a common goal in effective PD programs increases teachers’ collegiality, self-efficacy, sense of competency, and commitment to teaching. Darling-Hammond et al. (2009) contend that professional development programs “disconnected from practice do not allow teachers the time for serious, cumulative study of the given subject matter or for trying out ideas in the classroom and reflecting on the results” (p. 44). Penuel et al. (2007) agree that professional development that is removed in time from practice or implementation of the ideas contained in the workshop can be ineffective. The PD in this action research study was intentionally designed to be on-site and real-time so teachers could apply their learning and reflect on it both individually and collaboratively.

Collaborative learning that is applied in an authentic environment has potential in navigating change for improvement. Afterschool programs have been used as an effective avenue for supporting reform initiatives and triggering positive change within schools (Farmer-Hinton, Sass, & Schroeder, 2009). To transform afterschool programs into high-performing cultures, collaboration with a common goal of improving student

learning is essential (Toledo, 2018). Effective afterschool programs provide professional development opportunities for teachers to improve their practices (Holstead & King, 2011). Although its time frame was shortened, results from this study indicate that participants valued the opportunity for meaningful collaboration aimed at improving their own learning as well as student learning.

Using a Model to Explain Student Self-Regulated Learning is Important for Effective Implementation

All four participants embraced Zimmerman's model in learning about and teaching self-regulated learning. As indicated in Luke's periodic reminders to "keep it simple – focus on the three stages," the model served as a focal point for identifying effective strategies to promote self-regulated learning. Paris and Paris (2001) assert that even though self-regulated learning can be challenging to teach, all teachers should incorporate fundamental and intentional opportunities for students to become proficient in regulating their own learning. Theoretical models such as Zimmerman's phases and subprocesses of self-regulated learning can help in breaking down the concepts into teachable segments (Zimmerman, 2002).

Motivated by their shared understanding of the phases of self-regulated learning, each participant purposefully taught students how to self-regulate based on stages in the learning process. All participants used a sketch of Zimmerman's theoretical model to explain the phases and subprocesses of self-regulated learning. Although participants worked together in promoting self-regulated learning, each teacher had a distinct approach for teaching the phases. For example, data from the study revealed variations in teaching the self-reflection phase. Mary encouraged students to reflect on their work at

various points throughout the lesson. James asked students to reflect by writing about what math they learned and then sharing with a partner. Candace began her classes with a review of students' self-reflection journals and ended the class with a writing prompt for self-reflection. Luke asked students to reflect on their successes and challenges from self-regulating their own learning. Although participants addressed the importance of self-reflection at different points throughout their classes, they were all consistent in explicitly teaching reflection as a key process of self-regulated learning. Participants used the shared model as a guide to effectively implement self-regulated learning practices through their own design.

Implementing and Sustaining Lasting Change Requires Time

Data from the study revealed that all participants considered the professional development series to be beneficial, but they conceded that more time would be required to make a difference in both student and teacher learning. When Mary stated, " I think we need to do this more in afterschool to work together and do this together so we'll stick to it," she revealed that teachers need time to work together in implementing important changes. James noted that students also need time to implement necessary changes. He said, "I'm taking more time talking about self-regulation than telling them what math step to take next." Learning to monitor, direct, and evaluate one's own learning requires countless experiences over time. Students need time and guidance to develop an enduring understanding of self-regulated learning. The afterschool program can be used to provide additional time necessary in supporting student learning (Farmer-Hinton, Sass, & Schroeder, 2009). At the final meeting, the consensus of the afterschool math team was to continue this and similar studies in efforts to sustain and further their learning.

When Candace said, “we need to keep this up, so we won’t have to start all over again,” Luke responded, “yeah, this is something we don’t need to stop.” Participants were aware that implementing and sustaining lasting change requires time. When this study was paused due to the COVID-19 pandemic, the researcher and participants made immediate plans to continue their work remotely.

Implications for Practice in Context

When inevitable circumstances prompt change within a school setting, leadership should be flexible to maximize student learning. Adopting systems thinking is essential in identifying effective avenues for implementing change. School leaders should consider each individual component of the school as an opportunity to benefit all stakeholders (Lezotte & Snyder, 2011). Afterschool programs are major extensions of many school communities and should not be overlooked in their capacity to promote change initiatives (McCutcheon & Hadjiharalambous, 2016). Effective afterschool programs can offer supportive and creative practices that focus on the development of student learning, wellbeing, and self-sufficiency.

Providing meaningful opportunities for teachers to learn and collaborate is important in effectively implementing change. Professional development tailored to meet the specific needs of the school can be embedded in action plans to drive positive change. Effective implementation can involve just-in-time, job-embedded opportunities started on a small scale (Guskey & Yoon, 2009). Furthermore, teacher leaders can spearhead the PD to establish a trusting and outcomes-oriented environment (Young, McNamara, Brown, & O’Hara, 2018). Customized, collaborative, classroom-focused professional development can be a highly effective means of driving change.

Teaching self-regulated learning is important in motivating students to take ownership of their learning. Providing opportunities for students to develop their self-directive processes through goal setting, monitoring understanding, and reflection can transform students' mental abilities into academic skills (Zimmerman, 2002). Educators can embrace the value of self-regulated learning and use its power to motivate learners and increase their success.

Recommendations for Future Research

Further research that includes students' perspectives, other content areas, and teacher collaboration should extend from this study. Student data would be beneficial in measuring the effectiveness of the professional development series. Research should be conducted that could connect student academic achievement to the afterschool initiatives. Research might also extend to study the effect of the afterschool initiatives on students with learning disabilities.

Further study should also be conducted across content areas and during the regular school day. Although the results of the study indicated that math teachers successfully embedded self-regulated learning strategies into their practices, further research is needed to determine the effectiveness in other content areas. Furthermore, conducting research in other schools within the district across grade bands and content areas could be beneficial in measuring the effectiveness of the professional development series and afterschool initiatives.

A final recommendation for future research is to study the collaborative efforts of afterschool teachers within a professional learning community (PLC). This study revealed a positive impact on teacher practices when teachers participated in a two-week

professional development series. To determine if the changes are sustainable, additional study is necessary as teachers collaborate within an ongoing PLC.

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APPENDICES

Appendix A

Recruitment Protocol

I (Mechelle Nivens) am a doctoral student at Middle Tennessee State University. In order to fulfill my requirement for graduation, I am conducting a research study and writing a dissertation about student self-regulated learning .

You are invited to participate in this research study about student self-regulated learning. If you wish to participate, the research will begin with a pre-survey and classroom observation. Over a two-week time span, we will engage in three short (one to two hours) professional development sessions which will be followed by classroom observations and follow-up interviews (a voice recording will be used and safely stored in a password-protected computer). Finally, we will have a post training interview and a final survey about student self-regulated learning.

Once transcription of data is complete, you will receive the transcript through e-mail to correct any mistakes, correct misconceptions, or add to the data. When the report is completed, you will again be sent the report through e-mail to approve before publication.

Your responses will be anonymous, and your data will be confidential. Your participation in this project is voluntary. You are under no obligation to participate. If you do choose to participate, you may withdraw at any time and your data will be destroyed.

If you are interested in participating, please review the attached informed consent form from Middle Tennessee State University. If you agree to participate, please sign the consent form.

Thank you very much for your time.

Appendix B

Survey Questions

1. What does student self-regulated learning in a math classroom look like to you?
2. In your opinion, what impact, if any, does student self-regulated learning have on students' academic achievement in mathematics?
3. What classroom practices do you use to promote student self-regulated learning?
4. What practices do you use in the afterschool program to promote student self-regulated learning?

Appendix C

Observation Checklist

Criteria	Yes	No	Evidences
Learning Goals Are the learning goals explicit? Do students understand the goals?			
Meaningful Mathematical Discourse Is the teacher assisting students? Is the teacher encouraging students to explain their reasoning? Is the teacher asking probing stions? Is the teacher prompting students to discuss self-regulated behaviors such as seeking information and seeking help? Does the teacher have a system for providing peer-to-peer support?			
Is the teacher promoting self-reflection? Are students writing about the math? Is the teacher providing writing prompts?			

Appendix D

Post Observation Interview Questions

1. Overall, how do you think the lesson went?
    a) What mathematical concepts from the lesson do you think the students understand?
    b) What evidence led you to believe that?
    c) What mathematical concepts from the lesson do you think the students still need to work on?
    d) What evidence led you to believe that?
2. What practices did you use during the class time to promote student self-regulated learning?
3. What evidence did you notice regarding students' self-regulated learning?
4. What, if any, practices do you plan to introduce in future lessons to promote student self-regulated learning?
5. What impact, if any, do you believe student self-regulated learning strategies have on students' mathematical understanding?
6. Are there any other observations or insights you would like to share?

Appendix E

Journal Prompts for Participants

1. What do you want to take away from this professional development?
2. What do you currently know about student self-regulated learning?
3. What classroom practices do you use to promote student self-regulated learning?
4. How likely are you to promote self-regulated learning after this professional development?
5. What do you feel was the most important thing you learned today about student self-regulated learning?
6. How will you use the information you learned today in your classroom?
7. What do you feel are the first steps to promoting student self-regulated learning in your classroom?
8. What do you still want to learn about student self-regulated learning?
9. Are you feeling like you do not want to promote student self-regulated learning in your classroom? Why?
10. What do you think are the biggest obstacles for you to start promoting student self-regulated learning?
11. What do you think the biggest reward will be for you (the teacher) and the students once you start promoting student self-regulated learning?
12. What classroom practice(s) will you change to accommodate student self-regulated learning?

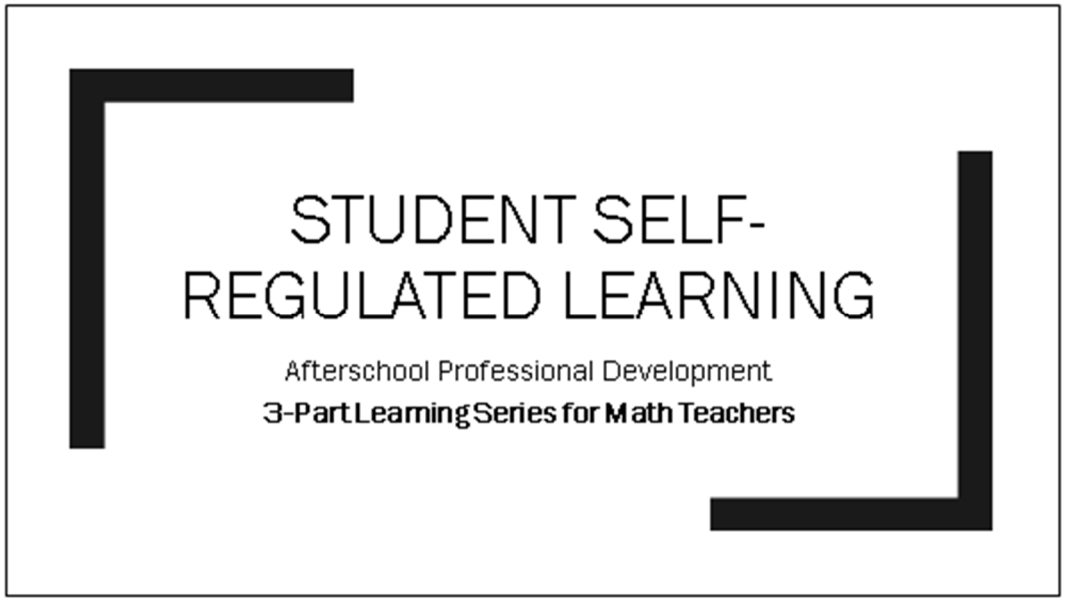
Appendix F

Final Interview Questions

1. Please describe the transformation, if any, that took place in your teaching practices as a result of the PD sessions.
2. What practices do you think you will maintain? Why?
3. What practices do you think you will abandon? Why?
4. Was the PD adequate to make you feel ready to promote student self-regulated learning?
    a) What more could the PD sessions have offered to make it easier to incorporate student self-regulated learning in your classroom?
5. What follow-up training do you believe you will need?
6. What advice would you give a teacher who is just starting to implement student self-regulated learning strategies in their classroom?
7. What types of support could other stakeholders provide in promoting student self-regulated learning?
    a) Administration?
    b) Team members?
    c) Parents?
8. Are there any other observations or insights about this PD experience you would like to share?

Appendix G

Professional Development PowerPoint Slides

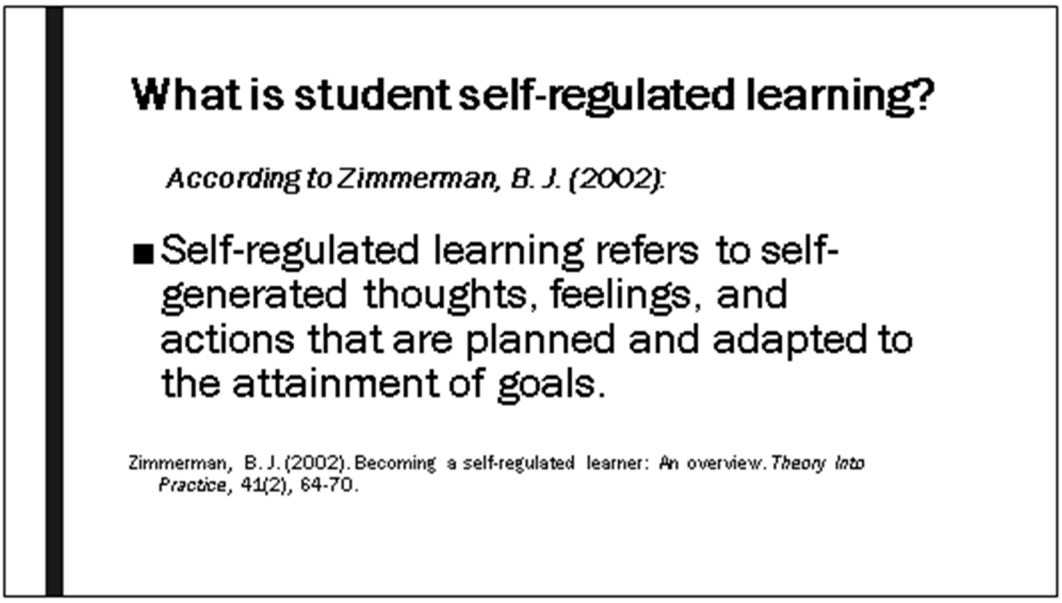


Thank you for participating in this research study about student self-regulated learning. In this 3-part professional development series, we will be discussing and developing our role in helping our afterschool students become self-regulated learners. We will learn strategies to use in helping our students regulate their own learning As we identify these strategies, we will immediately apply them in our afterschool math classes and meet back to evaluate and refine the strategies.

Slide 1

The objective of our first session is to discuss student self-regulated learning and its importance. We will use evidence-based research to identify strategies we can use immediately in our afterschool math classes.

Slide 2



To begin, let's define student self-regulated learning. Barry J. Zimmerman is a renowned educational researcher who has spent his career researching and developing theories about self-regulated learning. According to Zimmerman, self-regulated learning refers to self-generated thoughts, feelings, and actions that are planned and adapted to the attainment of goals. Through this definition, we can describe self-regulated learning as being self-generated; being driven by thoughts, feelings, and actions; being planned; and being adapted in order to reach a goal.

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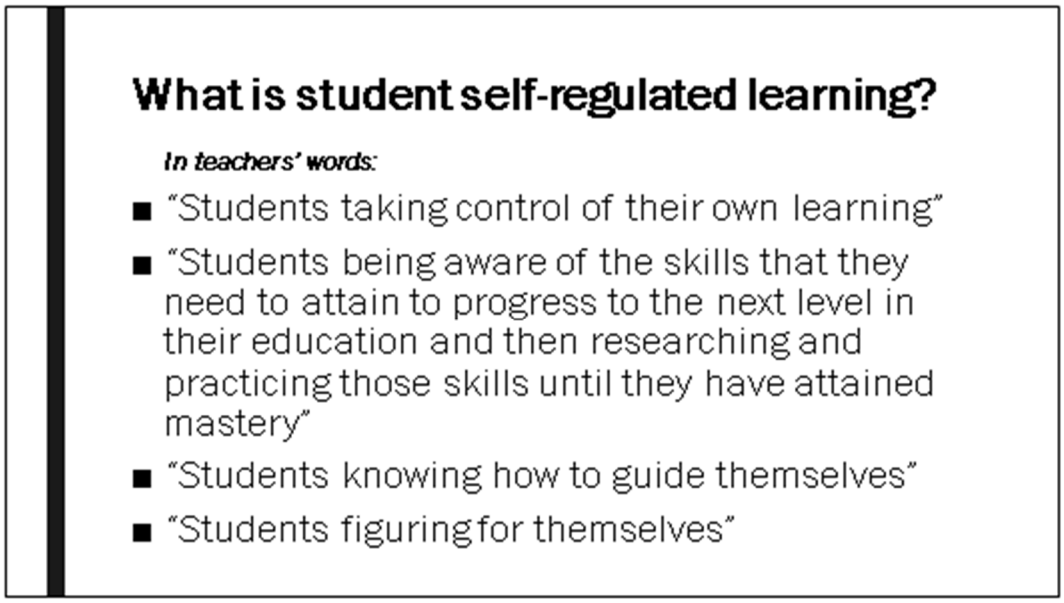

At the beginning of this research study, each of you completed a pre-training survey. In the survey, we described student self-regulated learning as students taking control, being aware, knowing, and figuring for themselves. These responses indicate that we too define self-regulated learning as being self-generated. Our responses also imply an understanding that self-regulated learning is driven by thoughts, feelings, and actions. And even though our descriptions do not mention the words planned, adapted, or goals, they insinuate such a need.

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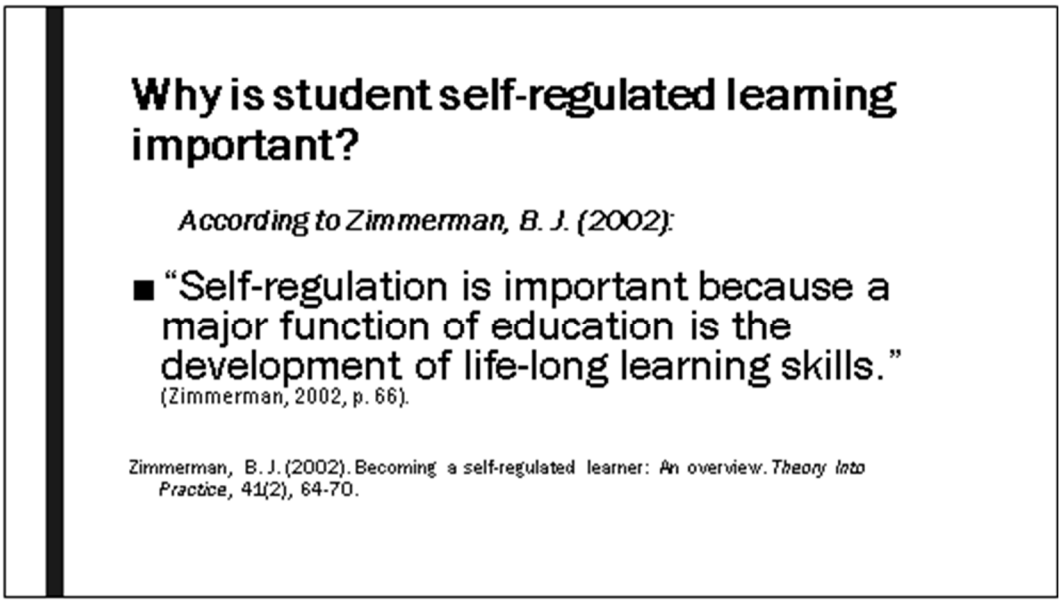
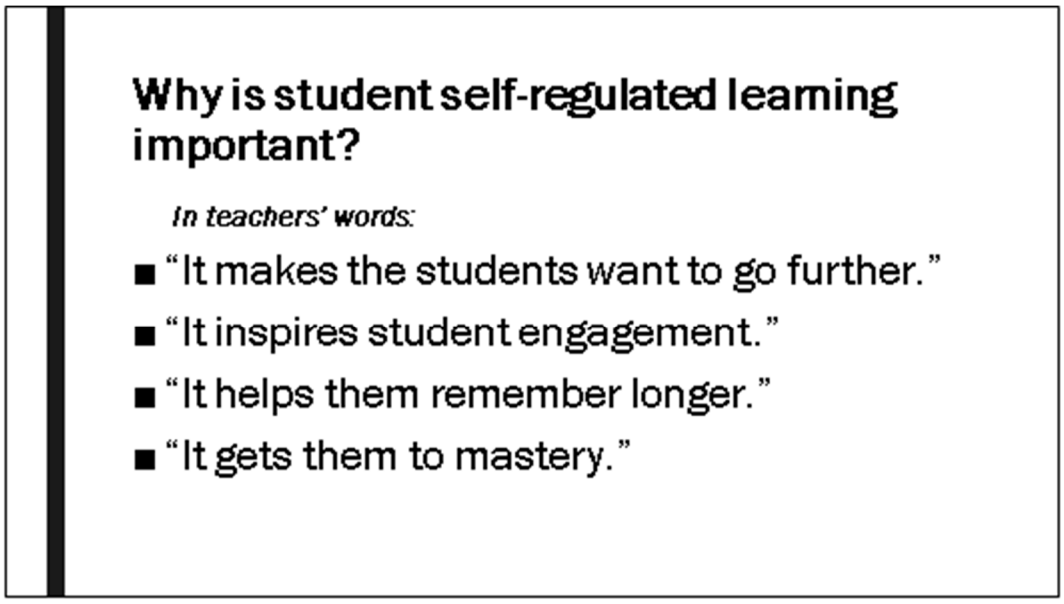


Zimmerman believes teaching students to be self-regulated learners is a key component of their education.

Slide 5



Through these responses on the pre-training survey, we also describe student self-regulated learning as a necessary component of our students' education.

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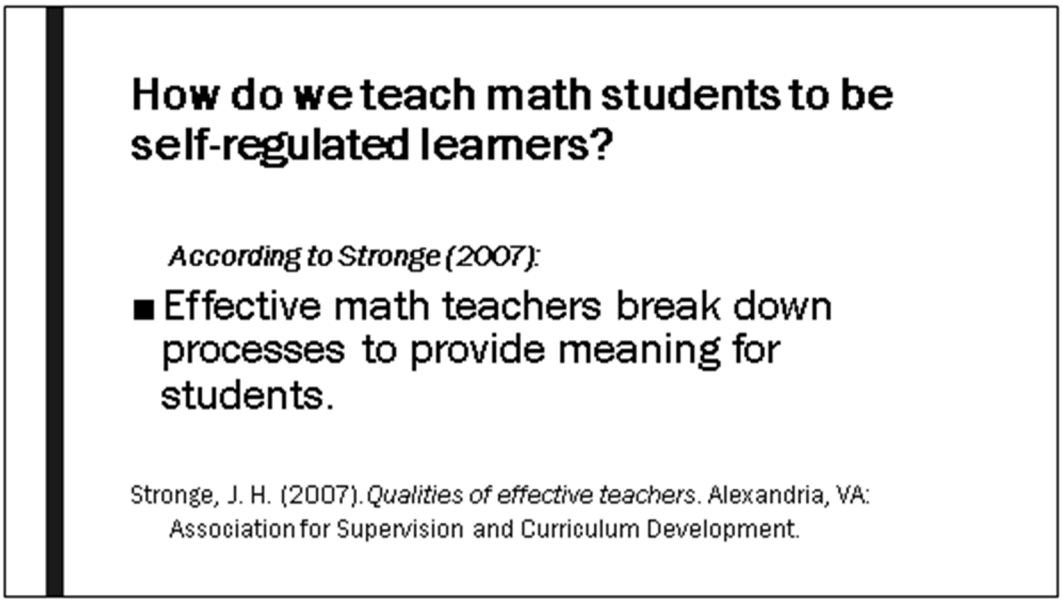
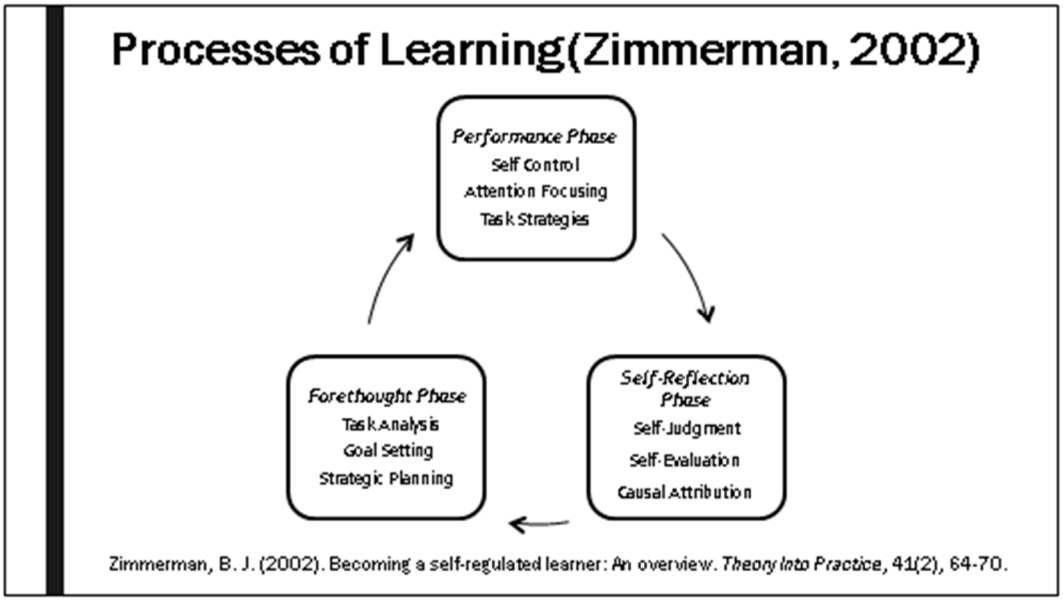


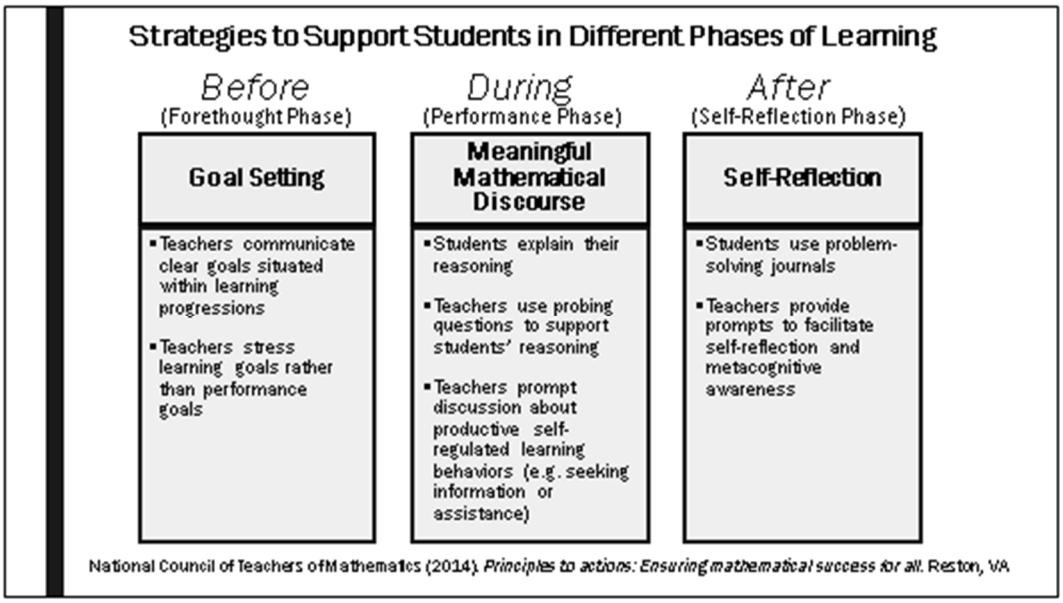
We know what student self-regulated learning is, and we realize the positive impact it has on our students. Now let's consider how we should go about helping students develop these abilities. In his book *Qualities of Effective Teachers*, James Stronge points out that we as math teachers are accustomed to breaking down mathematical processes to provide meaning for our students. Therefore, I think we should also break down the processes of self-regulated learning.

Slide 7



Since the 1970s extensive research has been conducted concerning the effects of teacher modeling and instruction on students' self-monitoring. Zimmerman and other researchers developed this model as a result of numerous studies. They broke down the process into 3 phases of learning efforts: before (forethought phase), during (performance phase), and after (self-reflection phase).

Slide 8



The three-part breakdown could serve as a bridge between research and our teaching practice. The examples of teaching strategies in this chart come from the National Council of Teachers of Mathematics (2014).

In the before learning phase, teachers communicate clear goals and help students set goals in which they focus on learning rather than performance.

In the during learning phase, teachers ask probing questions and create opportunities for students to explain their reasoning. Teachers provide students with strategies on how to regulate their learning such as seeking information or assistance.

In the after learning phase, ample opportunities are provided for students to write about and reflect on their learning and progress.

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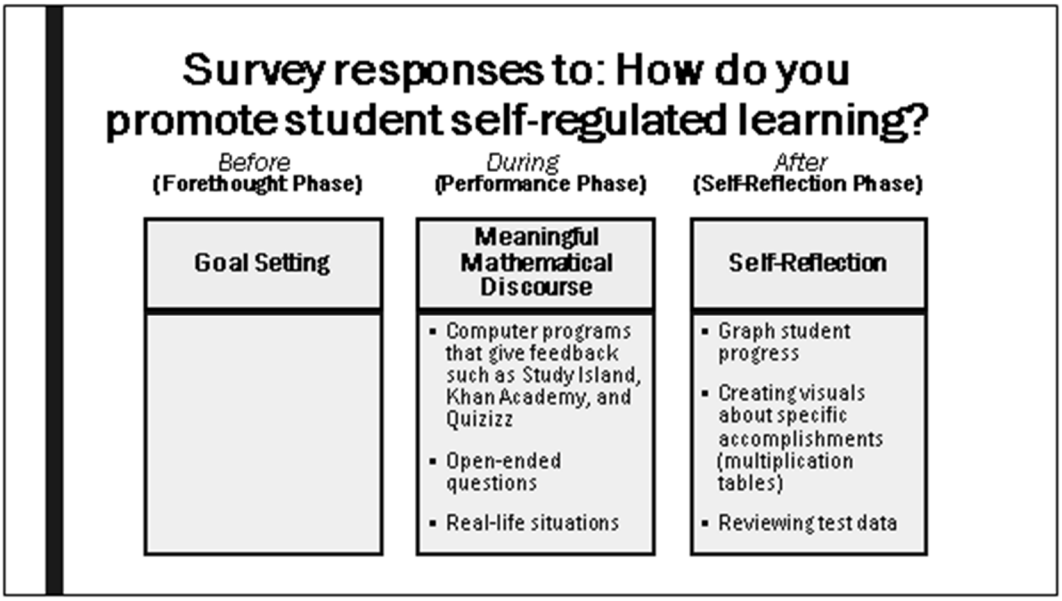


These are our responses from the pre-training survey. We mentioned some classroom practices we use to promote student self-regulated learning such as incorporating real-life situations, using computer programs that provide feedback, and graphing student progress.

In this first session of our training, we will focus on the forethought phase. As a team, several days ago we already established our unit plans. I propose that we begin explicitly sharing the learning goals we have in those plans with our students. I believe doing so will help students self-regulate their learning while they are engaged in the lessons.

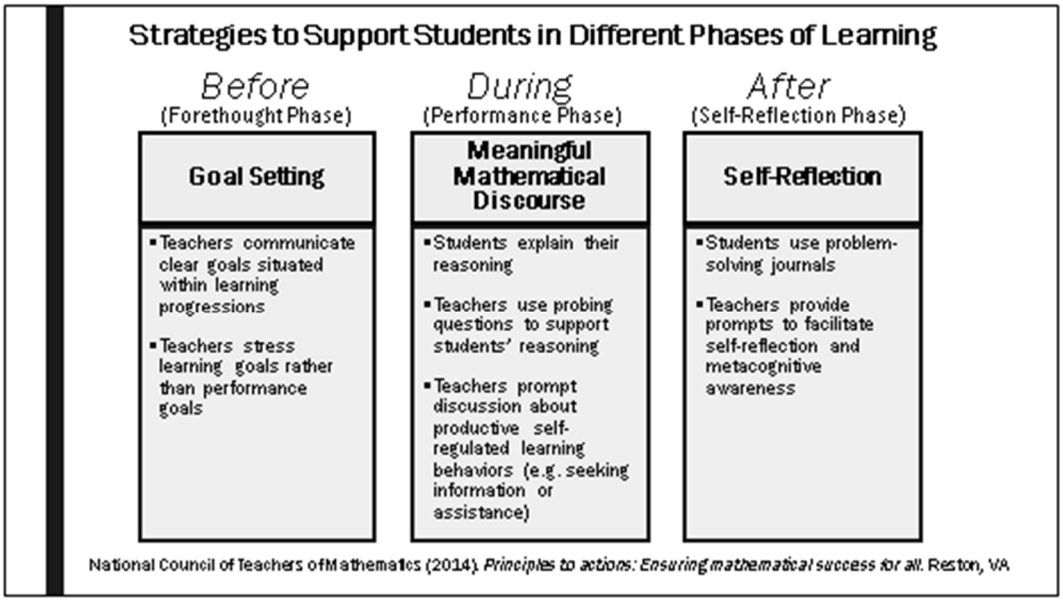
For our next math lesson, we will:

1) Communicate clear learning goals to our students
2) Help students focus on learning rather than performance

Slide 10

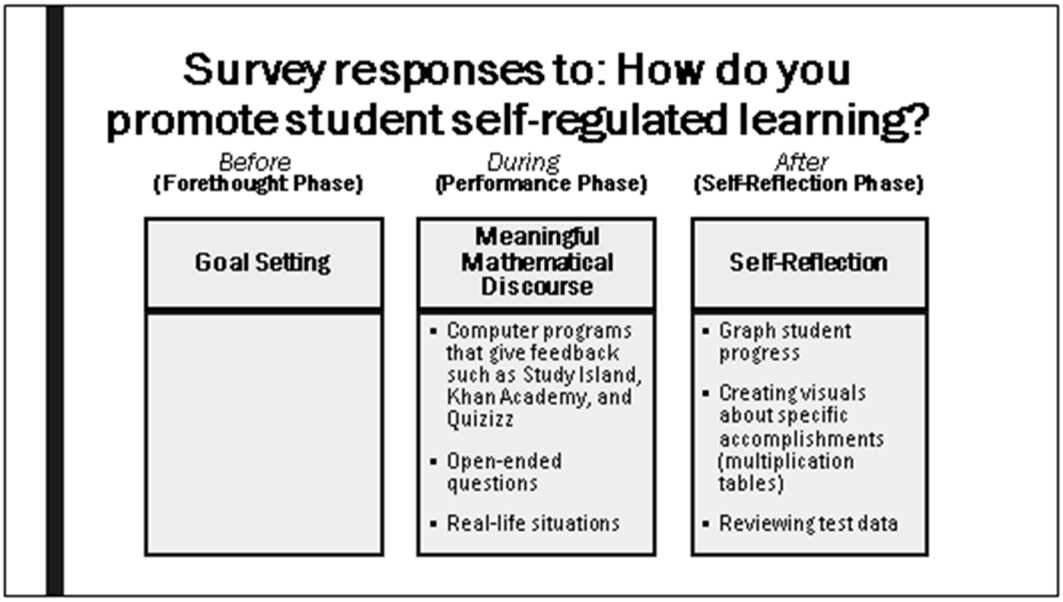
In our first PD session we discussed what student self-regulated learning is and why it is important. We decided to begin explicitly sharing learning goals with students to model for them how to set learning goals that focus on learning. Let's take a couple of minutes to share with one another how discussing and setting learning goals is working out in our classrooms.

Slide 11



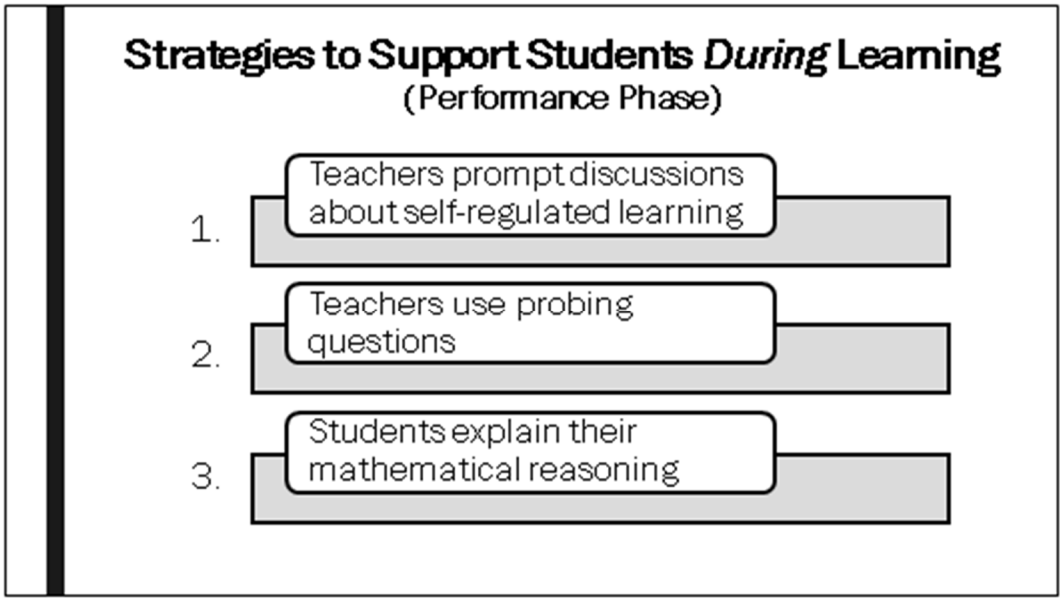
In this second session of our PD, we will focus on the performance phase of Zimmerman's model which occurs during learning. In this phase, teachers ask probing questions and create opportunities for students to explain their reasoning. Teachers provide students with strategies on how to regulate their learning such as seeking information or assistance.

Slide 12



In our pre-training survey, we mentioned that we already use computer programs that provide feedback, open-ended questions, and real-life situations to promote student self-regulated learning. We have already planned rich math lessons using these tools. To help students be more strategic in their thinking, I propose that we enhance our lessons by incorporating self-regulated learning strategies.

Slide 13



To help students be more strategic in their thinking, we can:

(1) prompt discussions about self-regulated learning connected to the particular assignment before they even begin;

(2) use probing questions throughout the class time to stimulate their thinking; and

(3) take time to ensure students explain their mathematical reasoning.

At our final PD session, we will share with one another our experiences from implementing these strategies.

Slide 14

In our first PD session we discussed modeling for students the importance of implementing learning goals which generally takes place at the beginning of the learning process. In our second PD session, we addressed the during learning stage. We decided to intentionally prompt discussions about self-regulated learning, use probing questions, and ensure students explain their mathematical reasoning.

Let's take some time now to discuss our experiences relating to the first and second PD sessions.

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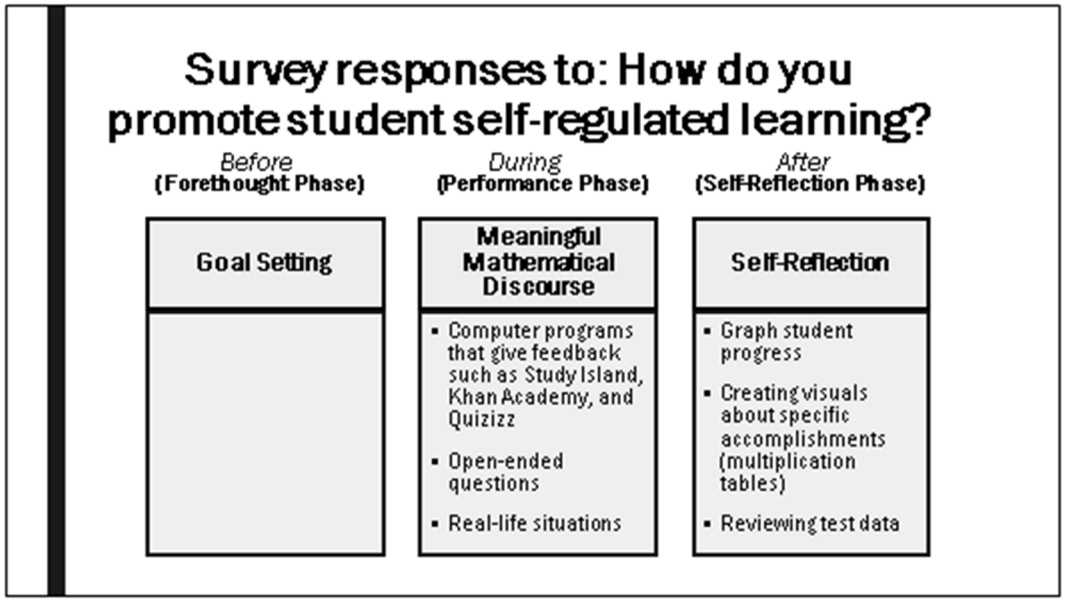
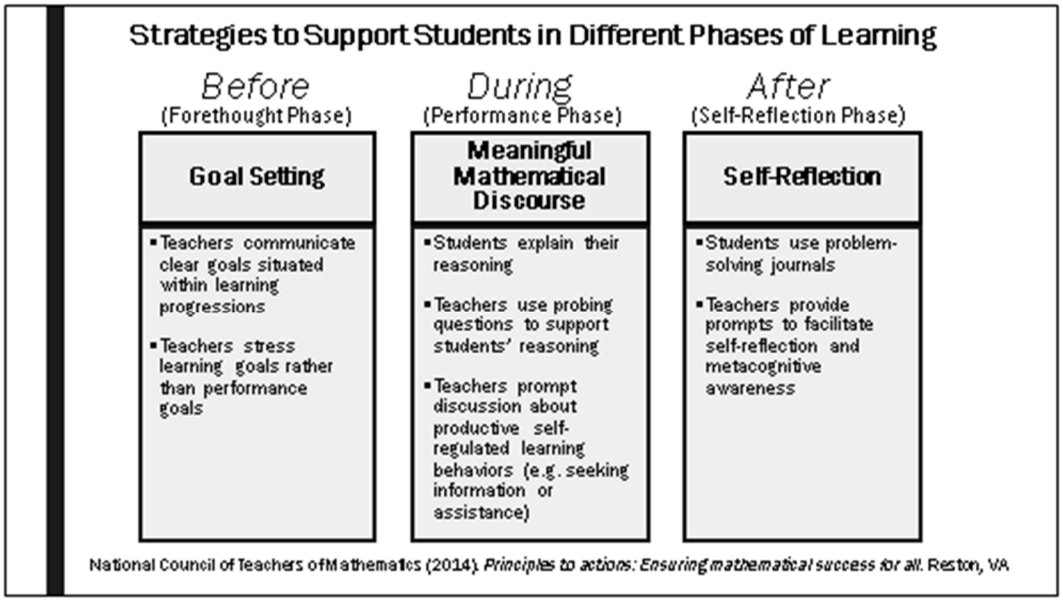


The focus of this final PD session is to discuss strategies for students to self-reflect on their learning.

In the pre-training survey, we reported that we already graph students' progress, create visuals about specific accomplishments, and review test data with students. These are all great ways to make learning visible to students and help them reflect on their progress.

Slide 16



We can make those practices even more effective if we provide each student with a journal. In the journal, they can:

(1) explain their reasoning in solving problems and

(2) write about and reflect on their learning and progress.

We can provide journal prompts that are aimed at facilitating self-reflection and metacognitive awareness.

We will share our experiences at our next lesson planning session.

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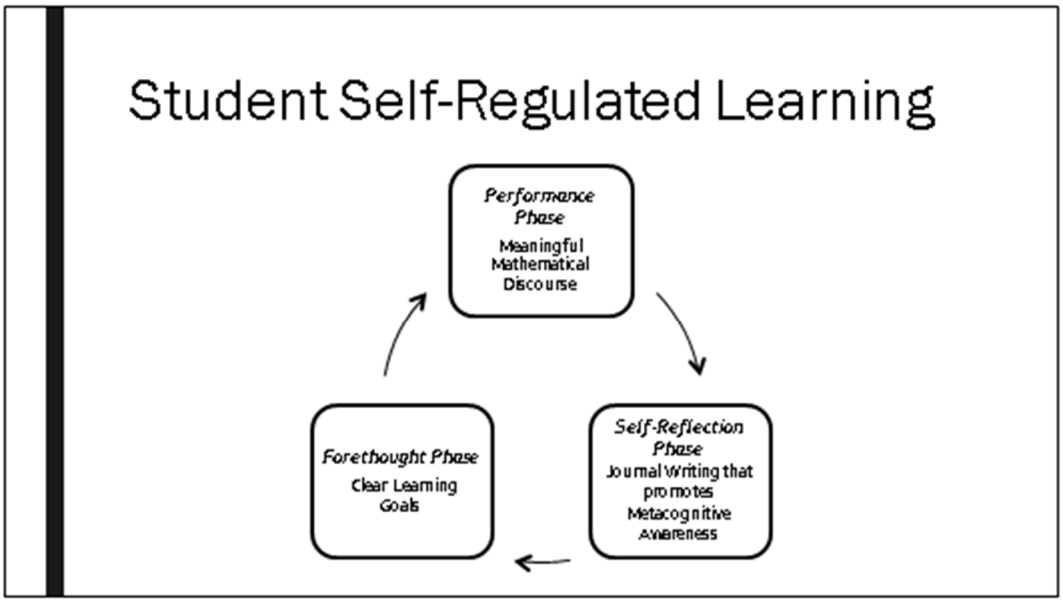

In these three PD sessions, we have tackled the important topic of student self-regulated learning by breaking it down into three major sections. Doing so has helped us articulate specific strategies to our students so they can be empowered to develop lifelong learning skills.

Thank you for your participation and I look forward to our ongoing teamwork in helping our students become self-regulated learners.

Slide 18