The Effect of Instructionally Embedded Cognitive Reframing on Students’ Self-Beliefs of Their Mathematical Competence

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THE EFFECT OF INSTRUCTIONALLY EMBEDDED COGNITIVE REFRAMING ON STUDENTS’ SELF-BELIEFS OF THEIR MATHEMATICAL COMPETENCE

by

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DEDICATION

For my students, past and present. You have made this rollercoaster of a career more worth it than I could have ever imagined. Thank you for allowing me to believe in you, and thank you for always believing in me, too. That so many of you still allow me to stay in your lives years after you have left my classroom is the greatest privilege. Perhaps this is just the love I have given you reflected back to me, but I would not be half the teacher I am today without each and every one of you. Forever in your corner and proud of you always.
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Thank you to my parents, who have always supported and believed in me no matter what. Thank you for your constant love and unconditional support of all my dreams.

Thank you to my friends who have cheered me on and who have been patient listening ears when I needed it over these past 3 years.

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ABSTRACT

Many students lack the ability to maintain positive perceptions of their mathematical self-belief, resulting in undesirable social, emotional, and academic outcomes. The purpose of this study was to investigate the impact of a cognitive reframing strategy on third and fourth grade math intervention students’ perceptions of their mathematical competence. This study sought to understand the impact of this emotional regulation strategy on students’ ability to autonomously regulate their negative or irrational thoughts related to their mathematics abilities, as well as the impact on their self-beliefs. Data for this study were collected through semi-structured interviews with students, student reflections, and researcher field notes. Findings indicated that embedding the cognitive reframing strategy into instruction helped students to autonomously cope with their maladaptive thoughts related to mathematics and helped students to be less avoidant and more resilient when faced with a mathematical task; however, the effect of the strategy on self-beliefs is unclear from the data in this study. These findings illuminate the need for emotional regulation skills to be embedded daily into academic instruction. Additionally, this study shows the need for further research to investigate strategies for helping students to reconceptualize their understanding of how self-beliefs form.
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CHAPTER 1

INTRODUCTION

A person would need only to spend a few class periods with my third and fourth grade math intervention students and me before hearing a repetitive chorus: “I can’t do this! I’m bad at math! This is too hard! Math is always too hard for me! I’m so mad at this multiplication right now! I’ll never get it!” In addition to their verbal displays of negative self-beliefs, students also exhibit physical signs of exasperation and frustration, such as refusing to try a new strategy, putting their heads down, and throwing their pencils or manipulatives onto the table in defeat claiming that they give up and will “never, ever try again.”

Some teachers respond to this behavior with eye rolls and the opinion that the students are being dramatic. They will say that they need to “just stop it and do their work.” I have observed this mindset from teachers, and my students have corroborated this to me during my pull-out instruction with them. My classroom is markedly different than my students’ other classroom experiences. They tell me that they feel more comfortable learning, failing, and expressing their emotions with me. This began to make me curious about how I can empower my students to take control of the social and emotional components of their learning experiences, regardless of the individual driving the classroom environment.

As illuminated by the above anecdote, students often lack the skills necessary to maintain positive perceptions of their own mathematical competence. Academically, this
results in work avoidance, less time spent on academic tasks, and missed learning of content. Socially and emotionally, as self-reported by my students, this can lead to anxiety around academic and intellectual endeavors. This phenomenon is well documented in education literature. Stran et al. (2020) and Hoffman (2009) found that students who struggle with emotional regulation are more likely to perform worse academically. On the other hand, Denham and Brown (2010) found that for mathematics specifically, students with the highest self-esteem and high perceptions of their academic competence displayed the most resilient mathematics outcomes. This is consistent with Wade and Ferree’s (2019) claim that self-belief, a critical social-emotional competency, is the best predictor of mathematics outcomes.

**Background Literature**

Existing literature is clear regarding the effect of emotional regulation on academic readiness and outcomes (Durlak et al., 2011; Hoffman, 2009; Immordino-Yang et al., 2018; Oberle, 2018; Šouláková et al., 2019; Stran et al., 2020). Students who struggle with emotional and behavioral regulation are more likely to perform worse academically (Hoffman, 2009; Stran et al., 2020). In contrast, data show that the “ability to self-regulate is associated with a range of academic, health, and behavioral outcomes, including predicting higher social engagement, attention, and academic achievement” (Stran et al., 2020, p. 262). This is true not only in the short-term, but in regard to behaviors into adulthood as well (Šouláková et al., 2019; Stran et al., 2020).

Davies et al. (2021) explained that although educators recognize that emotions mediate learning and behavior, they continue to focus on behavior management as the antidote to poor academic performance and undesirable behaviors because of its
perceived immediate effect on stopping these behaviors and redirecting focus to learning. In actuality, research shows that this reliance on traditional, controlling practices such as behavior modification to produce more desirable student behaviors has both short- and long-term effects that are damaging not only to students’ intellectual functioning but also their social-emotional capacities and functioning (Aloni, 2011; Assor et al., 2005; Immordino-Yang et al., 2018; Reeve, 2009; Wells, 2017).

Conversely, research has produced compelling evidence that classroom-based psychological interventions such as integrated cognitive behavioral therapy (CBT) strategies support learner autonomy and foster a greater sense of control over the perception of academic competence, resulting in increased academic achievement (Denham & Brown, 2010; Durlak et al., 2011; Hoffman, 2009; Mahoney et al, 2020). Further, Sotardi (2016) suggested employing daily measures in classrooms, including CBT-based strategies, that help students identify and manage stressors.

There is a clear delineation in social, emotional, and academic outcomes of emotionally supportive instruction and traditional instructional practices. Integrating CBT strategies into instruction is a logical fit given that these strategies empower individuals to be active participants in the problem-solving process, which helps to mitigate maladaptive emotional and behavioral response patterns that impede perceived academic competence and, therefore, leads to positive intellectual outcomes (Hofmann et al., 2012).

**Theoretical Framework**

The present study was grounded in the synthesis of three prominent theories: humanistic learning theory, cognitive learning theory, and cognitive behavior theory. The composite of these theories laid the foundation for the purpose of this study, the data
collection instruments, and the instructional intervention. This section will explain the central claims of these theories and their link to the development of students’ internal controls for emotional regulation and learning.

Rejecting the tenets of behaviorism, humanistic learning theory asserts that individuals have higher needs than behavior modification, memorizing information, and execution of response patterns to environmental stimuli (Bandura, 1982; Maslow, 1968). Humanistic learning is concerned with supporting the agency and dignity of students, rather than employing emotional or behavioral manipulation tactics to elicit a conditioned response or more desirable behavior (Aloni, 2011). This learning theory, therefore, holds the development of self-efficacy in high regard and places the responsibility on the teacher to foster a learning environment that supports self-efficacy by helping students to examine how their thought patterns and emotions influence learning (Bandura, 1982; DeCarvalho, 1991).

In essence, cognitive learning theory is the understanding of thought processes that help us to learn. It rejects the ideas of behaviorism, that behaviors are learned and influenced by external rather than internal forces. Instead, cognitive learning theory emphasizes the role of cognitive activities in the learning processes (Clark, 2018). A core tenet of cognitivism is the notion that individuals are capable of rational thought independent from external stimuli and that learning happens through active participation in the learning process. Thus, cognitivism emphasizes that knowledge is acquired by using internal processes such as thinking, remembering, perceiving, interpreting, reasoning, and problem-solving (Clark, 2018; Pritchard, 2017).
Cognitive behavioral therapy is based on the idea that an individual’s interpretation of a situation, rather than the situation itself, influences that person’s response (J. S. Beck & Fleming, 2021; Leder, 2017). CBT calls these interpretations “automatic thoughts,” which are often informed by maladaptive thought patterns the individual has developed about the self or the environment (J. S. Beck & Fleming, 2021, p. 1). A goal of cognitive behavioral interventions is to help individuals develop more adaptive mechanisms for meaning-making and interpreting the world and themselves (Asanjarani & Zarebahramabadi, 2021; Leder, 2017).

The present study combined the tenets of these three theories by investigating the effect of a cognitive and emotional-affective intervention on students’ social-emotional competencies and self-perceptions of academic achievement and competence. The purpose of CBT is to empower the agency of the individual so that the person can act autonomously in identifying and managing maladaptive emotional processes and patterns of cognition that may hinder desired outcomes (Asanjarani & Zarebahramabadi, 2021; Hofmann et al., 2012). This is linked to the goals of humanism in fostering the development of agency, autonomy, and self-efficacy and is also connected to the cognitivist belief that human learning and behavior are not just a response to the environment, but can be controlled internally, regardless of external stimuli.

**Purpose of Study**

The problem of practice that sparked this study is that many students lack the emotional regulation skills needed for mitigating various school-imposed stressors. These missing skills impede their ability to self-regulate, sustain positive self-beliefs, and progress toward mastering academic concepts. The purpose of this study was to
investigate the impact of integrating the CBT strategy of cognitive reframing into instruction on students’ perceptions of their mathematical competency.

Social-emotional learning (SEL) has been a growing topic in education. It has become especially relevant over the past few years as COVID-19 upended typical rhythms for schools and exposed areas of critical need for students and educators (Berry, 2020; Pattison et al., 2021). This is evidenced by an increase in the number of student referrals for mental health services and heightened concern over the availability of internal staff to meet this increased need (Pattison et al., 2021). As a result, breaking away from standardization and rigid academic practices and turning attention toward educating the whole child, especially regarding emotional health, has come into the spotlight (Berry, 2020).

The administration in my district has issued directives for faculty and staff to focus on the social-emotional well-being of students. To meet state standards, my school currently uses a stand-alone SEL program; however, my daily experience with students shows that there are still glaring gaps in students’ social-emotional regulation skills that present obstacles to learning. This is not only apparent in my own observations but also has been identified as an issue by other teachers. In personal conversations as well as intervention and referral services meetings, teachers have commented on students’ inability to cope with stressors and maintain emotional states that are conducive to their academic success.

This is not surprising given that social-emotional skill-building in the classroom is happening through isolated instruction, yet research indicates that SEL is most effective when it is integrated into instruction (Collaborative for Academic, Social, and Emotional...
Learning [CASEL], 2019b; Durlak et al., 2011; Mahoney et al., 2020; Stran et al., 2020) as opposed to being implemented as a separate entity. Given the proven effectiveness of CBT strategies in mitigating stress and supporting social-emotional competence by empowering individuals to autonomously identify and regulate their emotions and cognitions in everyday situations across multiple contexts in life (Hofmann et al., 2012; Leder, 2017), this study sought to answer the following questions:

1. What are students’ self-beliefs about their mathematical competence?
2. How do students’ self-beliefs about their mathematical competence affect their agency and autonomy over their learning?
3. How does the integration of cognitive reframing in math instruction impact third and fourth grade students’ perceptions of their own mathematical achievements and competence?

These questions served as the focus of this study in that they individually capture the three interrelated domains that encapsulate the instructional problem that this study sought to mitigate. This study specifically sought to determine the impact of a social-emotional intervention to help students develop the competencies necessary to maintain positive mathematics self-concepts. The claims that these research questions generated aimed illuminate the impact of the intervention on students’ emotional regulation with respect to their mathematical self-concept.

**Positionality Statement**

According to Herr and Anderson (2015), when a researcher is asked to understand and describe their positionality, they are being asked to critically analyze who they are in relation to others and how that is going to affect and inform the research. It is also
important to consider how Takacs (2002) expanded on this definition by discussing that “understanding positionality means understanding where you stand with respect to power” (p. 169). In reflecting on this concept that my positionality is going to change between different situations and contexts, I can more clearly see how I was both an insider and outsider throughout the research process.

My role as a teacher puts me in a position of power in my instructional setting, and it was critically important to me that I challenge that power and shift it away from myself and to my students. Bourke (2014) supported this idea, stating that “in order to be an ally and advocate, my work has to reflect the voices of those who participate in research” (p. 3). Bourke discussed this in relation to race, but it is also relevant here as well relative to my position of power due to my age, race, and socioeconomic status, as well as my socially constructed position in the school hierarchy.

I was an insider during this study in that I work in the setting where my research took place. I was also an insider because I have struggled historically with my own self-perceptions of mathematical competence. The negative self-belief in my mathematical ability started around third grade and affected the development of my mathematical competence through my college years and into the early years of my career as a teacher. It was not until I took a course in my teacher education master’s program about teaching math for the elementary grades that everything began to “click.” With a new way of looking at mathematical concepts, I began to see myself as a competent mathematical thinker. Despite that experience, I still struggle with reframing my mathematical self-belief when met with a mathematical task. I often revert to old perceptions that I am “bad” at math or that I am just “not a math person.” Consequently, I am right there in the
trenches with my struggling students when it comes to trying to maintain a positive self-perception of mathematical competence.

The demographics of the study participants was vastly different from my own social group indicators. I am a White, middle-class female who grew up in a predominately middle- to upper-middle-class community. The majority of participants of this study were non-White, working class, and growing up in a predominately non-White middle-to-working-class community (United States Census Bureau, 2021).

Conceptualizations of power when it comes to learning and who is “in charge” of instruction in the classroom have not changed much since my time as an elementary school student. As I worked to shift power to students by utilizing psychological interventions within my instruction, I expected there could be some resistance from students. I was careful not to assume that students would be open to working on these skills even if they self-identified that they struggled with them. I was also careful not to assume that certain students were more in need of these types of interventions. Additionally, I took care not to project personal difficulties with social-emotional dysregulation as a math student onto my students by assuming that they needed the same things I did just because they also might have been struggling.

Furthermore, I was an outsider in that I am in a position of socially constructed power over my students regarding opportunities afforded to me because of my race and socioeconomic capital. It was important for me to remember that these students are affected socially and emotionally in ways that I have never experienced, and I must remember that every day they—in marginalized bodies and at an age where they are just beginning to grapple with their identities—are navigating a school culture that upholds
hegemonic power structures in a society that has been designed to work against their social, emotional, intellectual, and economic well-being (Howard, 2010; Tate, 1997).

This clear contrast of social power can cause mistrust from the onset, so it was critical for me to continue to be reflective of the ways these conceptualizations of power influence the relationship between myself and my study participants and, in turn, influence the trajectory and outcomes of the study. Establishing trust with participants is an important aspect of action research as both researchers and participants navigate their sociocultural contexts throughout the research process (Bourke, 2014). By nature, social-emotional growth requires vulnerability and I recognize that not all students are always comfortable with being vulnerable, especially given my relationship to power versus my students’ relationship to power. Therefore, students were able to opt-out at any time and were also allowed to return to the study at any time.

**Research Design**

This study followed a qualitative action research design guided by narrative inquiry as the main means for data collection and empowering participant voice throughout the research process. The choice of utilizing narrative inquiry as a framework for research design was informed by the emphasis that the two learning theories place on learner empowerment, agency, and self-efficacy. Action research is a deliberate and systematic process of reflection requiring evidence to support claims and address a specific problem of practice by taking actions that lead to changes within a setting, the participants, or the researchers themselves (Efron & Ravid, 2013; Herr & Anderson, 2015; Ma et al., 2018). Since the purpose of this study was to address a specific problem
to produce outcomes that lead to positive change in a specific setting, action research is the most appropriate methodology and design.

Additionally, the intervention employed in this study sought to create change by empowering student voice and ownership over cognitive and emotional-affective processes. To achieve this, I conducted semi-structured interviews with each participant individually wherein I asked them questions to understand their general beliefs about themselves and their math ability (see Appendix B). As the interviews proceeded, more questions arose from their responses, but I guided the conversation so that I was able to ascertain their perceptions of their academic competence and their ability to shift their self-narratives around those perceptions.

From there, I used resources from Mindful and Kind Counseling (Ross, 2021) to explicitly teach the CBT strategy of cognitive reframing during a 20-minute small group intervention period. Throughout the intervention, students were prompted to utilize this skill to help themselves identify and manage any in-the-moment emotion that impeded their readiness or willingness to persevere through a mathematical task. Although I taught the intervention strategy through direct, isolated instruction, after that first direct instruction session the strategy was integrated throughout instruction. This is different than what is currently happening in classrooms with a stand-alone social-emotional learning program, wherein skills are being taught in isolation without explicit frameworks for follow-through during instruction.

At the end of each class, students completed a reflective exit ticket using the strategy they were taught to reframe their mathematics self-beliefs. This was completed via a Google Form where their responses were populated directly into a password-
protected spreadsheet. After the intervention, I conducted semi-structured interviews with the same questions as the pre-intervention interview (see Appendix B) to determine any growth in students’ self-identified abilities to identify and manage their emotions, growth in understanding of how self-beliefs mediate learning, and growth in their perceptions of their academic competence and progress.

Throughout the intervention, I thematically coded qualitative data from student responses to determine whether the intervention needed to be adjusted as we proceeded through the weeks of the study. In the last phase of the study, I conducted post-intervention semi-structured interviews. The purpose of the interviews was to give students ownership over the effectiveness of the intervention and the validity of the study.

This intervention aimed to empower participants by centering their voices as much as possible. Therefore, the research method was grounded in narrative inquiry, a psychological approach that focuses on participant experience, centering their contextualized knowledge and cognitive and affective experiences of meaning-making (Merriam & Tisdell, 2016). The data could have been quantified easily by using surveys with rating scales, but I was more interested in student stories and reflections on the impact of the intervention. This more effectively centered the voices of my participants, giving them more ownership over both the research process and knowledge constructed by the study (Caraballo & Lysicott, 2020; Merriam & Tisdell, 2016).

The setting for this study was an elementary school in a working-to-middle-class New Jersey suburb that serves students in kindergarten through fourth grade. According to the New Jersey Performance Report for School Year 2021-2022, 32.0% of students at this school are economically disadvantaged, 14.8% have diagnosed disabilities, and
10.6% are multilingual learners. Race and ethnic category demographics are 9.9% White, 57.8% Hispanic/Latino, 14.3% Black or African American, and 15.5% Asian (New Jersey Department of Education, 2023).

This study specifically focused on third and fourth grade students who received instructional intervention services for mathematics at the time of data collection. These students did not have individual education plans (IEPs) or receive special education services. They were identified as needing instructional intervention in mathematics based on district criteria for instructional intervention services. Fourteen students participated in this study. Two of them had behavioral 504 plans. Eleven were multilingual learners, all with the required English proficiency for participation in the study. Nine were economically disadvantaged, as marked on the demographics sections of their official school records. Eleven were Hispanic/Latino, one Black, one Asian, and one White. These demographics closely reflect the overall demographics of the school.

This study sought to gain insight into a specific phenomenon; therefore, purposeful sampling was used to select the participants. According to Merriam and Tisdell (2016), purposeful sampling in a qualitative study enables the researcher to derive an in-depth understanding of the issues that are central to the inquiry because it provides the researcher with information-rich cases. In this case, participants were purposefully sampled from students who had stated explicitly that they were “bad at math,” mentioned issues related to being stressed or anxious because of math, or had observable, patterned signs signifying stress or anxiety with mathematics. These specific selection criteria were employed in order to study the effect of a cognitive-emotional intervention on self-belief as a mitigating factor for learning-imposed stressors. I purposefully sampled from the
students who I see most frequently for instruction to ensure that we were limited as little as possible by any potential scheduling constraints or factors outside of my control, such as being pulled to cover a class because of a substitute teacher shortage.

**Data Collection and Analysis**

Sources of data included pre- and post-intervention semi-structured interviews, researcher field notes, and student reflections in the form of exit tickets (*student reflections* will refer to the exit tickets throughout this text). These choices made the most sense for centering participant perspective and knowledge, especially the semi-structured interviews, which helped access students’ perceptions of the problem that this study sought to mitigate (Merriam & Tisdell, 2016).

This rationale follows the idea that the chief aim of any form of qualitative research is to make meaning (Satchwell et al., 2020). Qualitative researchers decide what kind of data they are going to collect based on the theoretical frameworks they use to make sense of a phenomenon and the degree of ownership they want to afford to their participants (Asakura et al., 2020). The data collection tools in this study complement one another well in that the interviews and reflections give full ownership to students, and researcher field notes provided outsider data to compare with student reports. No changes to the intervention were based solely on field notes; rather, the one change that was sparked by these notes was supported by student data. This grouping of data collection tools offered a more comprehensive picture of how the intervention played out throughout the study.

I identified a problem through my observations and experience, but it was my students who were most directly affected by the study; therefore, the students’ voices
were centered. By utilizing data collection instruments such as interviews and student self-reflections to empower student voice, the goal was that my own initial observations and field notes would not matter much in the end and that students’ contributions would serve as the most powerful evidence for the necessity of transforming academic interventions and social-emotional learning practices in the classroom.

Semi-structured interviews took place with each participant individually at the start of the study before the intervention began and again after the intervention period ended. Questions were general, concerning students’ thoughts and experiences with learning, beliefs about school, and beliefs about math. More specific questions were asked subsequently to ascertain participants’ current understanding of the role of emotions in learning, whether they had the tools they needed to manage their emotions, and beliefs about their mathematical competence.

The end-of-study interviews were also semi-structured. These interviews began with the same questions as the pre-intervention interviews and then flowed into more specificity regarding the purpose of the intervention (see Appendix B). Interviews were documented via audio recordings and field notes. Both sets of responses for each student were compared to look for evidence of growth or change, and then all participants’ interview sets were inductively analyzed. As opposed to a deductive process in which the researcher starts with a hypothesis and then tests that hypothesis, an inductive process is one in which the researcher gathers data to construct new theories, concepts, or hypotheses (Merriam & Tisdell, 2016). Any patterns that emerged from the cross-examination of interview sets were thematically coded. Those themes were then compared to the coded themes that emerged from the student reflections as the
intervention was happening to look for any consistencies or inconsistencies with claims generated by the themes from student reflective exit tickets.

A visual with a structure for how to utilize the CBT strategy of cognitive reframing was included at the top of the student exit tickets (See Appendix B). The strategy was called “Lemonade,” for a more elementary student-friendly moniker (Ross, 2021). Students used a Google Form as an exit ticket to practice the CBT skill of cognitive reframing to reflect at the end of each lesson about whether they experienced a negative or irrational thought about their mathematics abilities or self-beliefs that day. Filling out these reflection forms was their place to reframe their self-narratives, or further celebrate their positive self-beliefs if they found themselves with no negative or irrational thoughts during the session that day.

**Significance and Limitations**

This study built on the idea that integrated social-emotional learning practices are highly effective in supporting students’ social-emotional competencies and academic readiness and outcomes both within and outside of the school setting (CASEL, 2019b; Durlak et al., 2011; Mahoney et al., 2020; Stran et al., 2020). Educators, school administrators, and school guidance counselors are the intended audience for this study, but students will find it the most significant in that the potential benefit of the study will be greatest for them. It could be transformative for not only students’ present lives in the various communities to which they belong but also their futures. According to Šouláková et al. (2019), Stran et al. (2020), and Wade and Ferree (2019), positive self-concept and the ability to self-regulate emotions are predictors of higher social engagement and academic achievement, not only in the present but well into students’ futures.
This study also holds implications for students becoming active and informed citizens who work to contribute to transformative social justice efforts in their communities and the world at large. Humanistic instruction that meets the needs of the whole child effectively builds students’ social-emotional skills such as self-awareness, self-management, social awareness, relationship skills, and responsible decision-making—all skills that help people to develop the capacity for empathy and compassion and to be reflective of their own biases (Mahoney et al., 2020). When people are empowered with the strategies necessary to participate in critical self-reflection, they feel more comfortable and competent in their ability to handle topics that require emotional vulnerability, such as challenging everyday injustice as well as institutional structures of power and control (Goodman, 2011). Therefore, building students’ social-emotional competencies can enable them to become positive changemakers and active citizens in a diverse society.

Some members of the intended audience may find this study evocative based on what their prior held beliefs were about how learning happens and what instruction and learner management should look like to produce desirable social, emotional, and academic outcomes. Those who still subscribe to a behaviorism approach of rewards and other forms of extrinsic behavioral and emotional control to bring about desired student behaviors and academic outcomes could have a difficult time believing the purpose, data, and outcomes of this study. As Davies et al. (2021) noted, educators are often comfortable with behaviorist approaches because of the perception that those types of strategies have an immediate and direct impact on reducing problem behaviors and
improving academic outcomes; however, they do not tend to produce long-term, sustainable changes for students’ behavioral and emotional regulation.

A limitation of this study was the inability to implement the intervention with perfect consistency. Due to a persistent substitute teacher shortage, the academic support teachers at my school were pulled frequently to cover classes. This minimized instructional time with participants and impeded the ability to implement interventions with consistency.

The short period of time (4 weeks) could have been a limitation as well. Ideally, data would be collected over a longer period to ascertain the sustainability of the intervention. A shorter time for this intervention was chosen because my students can have difficulty sustaining attention to a skill over time. If I do not move on, incorporate the skill into something new, or change the way I am going about teaching the skill, they tend to be “over it,” as they would say, rather quickly. Consequently, I determined that 4 weeks was an appropriate length of time for them to be able to learn, practice, and begin to internalize the strategy without becoming bored or restless. Another limitation related to the students’ age and maturity level was that they did not have a robust enough emotional vocabulary to be able to start reflecting on their own right away.

Additionally, some might see the small sample size as a limitation, but it is common in qualitative research to have a smaller sample size (Efron & Ravid, 2013), especially in qualitative approaches that draw from narrative inquiry for the research design (Creswell & Creswell, 2018). In studies that seek to understand the narratives and experiences of individuals with respect to a specific issue, it is more effective to sample
based on the relevance of the participants’ experiences with the issue being studied so that the researcher ends up with rich, robust data (Efron & Ravid, 2013).

**Dissertation Overview**

Chapter 2 of this dissertation provides an in-depth synthesis of the literature and theoretical base that informed and grounds this action research study. Chapter 3 details the methods of research used including the research design, data collection instruments, and methods of analysis used to interpret the significance and implications of the research outcomes. Chapter 4 contains a thorough analysis of findings, including a discussion of the importance of the themes that emerged from the data. Chapter 5 concludes the dissertation by detailing the action plan that was developed and informed by the outcomes of the study and continued need in the practice setting.

**List of Definitions**

*Social-emotional learning (SEL):* “SEL is the process through which all young people and adults acquire and apply the knowledge, skills, and attitudes to develop healthy identities, manage emotions and achieve personal and collective goals, feel and show empathy for others, establish and maintain supportive relationships, and make responsible and caring decisions” (CASEL, 2021).

*Social-emotional competencies:* “SEL competencies are essential knowledge, skills, attitudes, and mindsets that individuals need to succeed in life. SEL competencies are the product of social and emotional learning (SEL)” (CASEL, 2019b).

*Cognitive behavioral therapy:* A form of psychotherapy based on the premise that the way an individual thinks or feels affects how the person responds to a situation or stimuli (Hofmann et al., 2012).
*Instructional intervention:* Strategies used to target critical gaps in learning outcomes.
CHAPTER 2
LITERATURE REVIEW

Students often experience stress both at and because of school. Repeated themes in discussions with students include feeling afraid to ask questions, feeling a lack of autonomy, and feeling forced into specific behaviors and ways of learning that often do not make sense to them and/or are hypocritical. Some students have articulated not only how this affects them socially and emotionally, but also how it affects them academically. Students have also articulated how they do not have the social-emotional skills to appropriately deal with the social, emotional, and academic stressors they incur in and out of school. It is critically important for this issue to be addressed because if it is not, schools will continue to reproduce negative outcomes in social, emotional, and intellectual well-being that will affect students and their communities not only in the present but in the future as well (Broom, 2015; Immordino-Yang et al., 2018; Oberle, 2018; Oberle & Schonert-Reichl, 2016).

The problem of practice this study sought to act on is that many students lack the emotional regulation skills necessary for maintaining positive perceptions of their academic competence, resulting in negative self-concepts that contribute to undesirable academic readiness and outcomes. The study sought to answer the following questions:

1. What are students’ self-beliefs about their mathematical competence?
2. How do students’ self-beliefs about their mathematical competence affect their agency and autonomy over their learning?
3. How does the integration of cognitive reframing in math instruction impact third and fourth grade students’ perceptions of their mathematical achievements and competence?

**Purpose of the Study**

My observations as a practitioner revealed that students hold negative mathematical self-concepts that create a barrier to mastering mathematical skills. Therefore, I was curious about the effect of utilizing the CBT strategy of cognitive reframing, as strategies such as this have proven to be effective in mitigating stress and supporting social-emotional competence by empowering individuals to autonomously identify and regulate their emotions and cognitions in everyday situations across multiple contexts in life (Hofmann et al., 2012).

**Literature Review Methodology**

Literature reviews serve an important purpose. In action research, the literature review shows that the researcher is familiar with current viewpoints and arguments and intends to situate the current problem of practice within that research (Herr & Anderson, 2015). Researchers must synthesize and reflect on various perspectives they are using to inform their studies because this adds to their trustworthiness as both researchers and practitioners.

A variety of key terms and phrases were used to search within EBSCOhost, Google Scholar, and the general Google search engine. Key terms and phrases included *classroom management, issues in classroom management, social-emotional learning, issues in social and emotional learning, cognitive behavioral therapy AND elementary students, cognitive behavioral therapy in schools, elementary students’ autonomy, effect*
of stress on elementary students, and elementary students’ self-concept. From there, literature was chosen that was relevant to the problem of practice and research questions. The reference lists of those pieces of literature were then mined for additional relevant supporting and opposing literature. Sources used for this literature review include books, academic journal articles, and chapters in edited books.

The remainder of this chapter discusses the broader socio-political context of this problem of practice as well as the theoretical frameworks that ground the justification for the problem, research questions, research design, and data collection methods. First, historical perspectives are used to frame the problem in a larger context of institutional power and control. Then, issues of controlling societal values and learning environments are connected to mathematics anxiety and the development of a negative math self-concept. Following that is a discussion of negative self-concept on academic readiness and outcomes, and how current social-emotional learning practices designed to support academic achievement are proving inadequate.

**Historical Perspectives and Socio-political Context**

This section covers the broader historical and societal context that situates the problem of practice for this study. Ideologies of curriculum and schooling, cultural and societal values about education, and current problematic instructional beliefs are explained in depth. The tenets of these ideologies justify the underpinnings of the development of students’ negative academic self-concepts.

In 1913, the social efficiency ideology became prevalent in American schooling. This ideology demanded that teachers use techniques of production developed by industry to produce specific outcomes (Schiro, 2013). This idea dates back further in the
general landscape of American history. It was first introduced to manage enslaved workers on plantations to increase output and lower the cost of production by increasing order, standardization, efficiency, and social control (Casey et al., 2013). This scientific method of efficiency involved assigning people specific tasks to produce specific outcomes. The entire ideology hinges on control, discipline, order, obedience, rules, and time (Casey et al., 2013).

During the rise of industrialization in the United States, proponents of the social efficiency ideology compared schools to factories, where the child is essentially the raw material, the teacher is the factory worker, and the curriculum is what turns the raw material (child) into a finished product (adult); (Schiro, 2013). This resonated with educators who were trying to prepare students for their place in the labor market at the height of industrialization and has since, even to this day, become firmly entrenched in the ideals of American schooling (Casey et al., 2013).

This entrenchment of order, control, and behavioral engineering can be seen most clearly in classroom management practices, with even the term management rife with implicit tones of power, control, and hierarchy (Casey et al., 2013; Wells, 2017). Classroom management aims to produce desirable student behavior, and much time and attention is devoted to developing teachers’ ability to effectively control their classrooms. Teachers report consistently that they struggle with classroom management more than any other aspect of instructional practice, with 40% of new teachers reporting that they do not feel prepared to handle discipline problems in the classroom (Freiberg et al., 2020). It is important to note that this often leads to high levels of student stress and low academic achievement (Oberle & Schonert-Reichl, 2016).
Today, the emphasis has shifted from the factory to corporations, but the goal remains the same: produce efficient workers (Casey et al., 2013). In contrast, there is now recognition that an efficient worker is an emotionally competent one. In the early 1990s, emphasis began to be placed on social-emotional learning (SEL), in part as a response to this desire from corporations but mostly because of growing issues with social and emotional problems in children and the recognition that schools were in a unique position to mitigate those risks (Hoffman, 2009). Between 2006 and 2017, one study of 18 classroom management programs showed a three-fold increase in social skills training as part of the curriculum (Freiberg et al., 2020).

Despite this curricular shift, the emphasis on high-stakes testing and data-driven learning initiatives in recent years has created a top-down culture of accountability that has allowed behaviorist management pedagogies and social efficiency curriculum ideologies to thrive (Wells, 2017). Behaviorism seeks to produce a desired set of behaviors by following specific rules and standards that successfully squash student voice and reify unhealthy, capitalistic models of competition that reproduce societal power structures, impede equity, and bring about the overall failure of the American education system (DeCarvalho, 1991; Jagers et al., 2019; Wells, 2017). DeCarvalho (1991) credited Maslow and Rogers as the two main psychologists who championed the humanistic psychology movement in the 1960s, believing the solution was a paradigm shift away from behaviorism and authoritarian control toward one that empowers the student with voice, choice, and agency.

The focus on compliance to make students manageable, and treating them as empty vessels being filled with information, successfully disconnects students from their
learning and disempowers them as human beings (Broom, 2015). Most teachers agree that they want to empower their students, but they end up buying into traditional teacher-controlled instructional practices because those practices are more culturally valued within their institutions and society (Broom, 2015). Often, teachers feel pressure from administrators, parents, and other teachers to adopt teacher-controlled practices to fit into the social order and norms of their schools (Broom, 2015; Wells, 2017). In fact, managing student behavior is seen in public polls as one of the top concerns of teachers, parents, and the public (Casey et al., 2013).

Broom (2015) argued that one of the main goals of teaching should be to empower. Empowered individuals produce active behavior that positively influences themselves and others. This is linked to the concept of self-efficacy. Self-efficacy is the belief that one can control one’s own life and make positive changes for oneself and others (Bandura, 1982; Broom, 2015). Self-efficacy is related to identity: how one labels oneself. When someone is empowered and operating out of a sense of self-efficacy, the individual can accurately consider varied perspectives, think critically and independently, thoughtfully make decisions, and act in the best interest of the person’s community (Bandura, 1982; Broom, 2015; Goodman, 2011). Conversely, when someone feels disempowered, that person is often resistant. Broom (2015) purported that the ability of individuals to act autonomously, with the self-efficacy and empowerment necessary to enact change, is a civil right and social responsibility, because “individuals who are good rule followers don’t necessarily make for active citizens” (Broom, 2015, p. 81).

Additionally, humanistic instruction effectively builds students’ social-emotional skills such as self-awareness, self-management, social awareness, relationship skills, and
responsible decision-making—all skills that help people to develop the capacity for empathy and compassion, and that aid in becoming reflective of their own biases (Mahoney et al., 2020).

Social-emotional competency, therefore, is necessary for the preservation of democracy and foundational to dismantling oppressive systems of power and control to bring about equity and justice. The connection to social justice is clear: When people are empowered with the strategies necessary to participate in critical self-reflection, they feel more comfortable and competent in their ability to handle topics that require emotional vulnerability, such as challenging everyday injustices and institutional structures of power and control (Goodman, 2011).

Building students’ social-emotional competencies can enable them to become active citizens in diverse societies by fostering skills such as self-awareness, self-management, social awareness, relationship skills, and responsible decision-making (Mahoney et al., 2020). These skills can create a foundation for students to begin to identify and understand how their implicit ideologies of selfhood are inextricably linked to cultural norms, hegemonic power, and the structuring of the educational system in the United States, thus empowering the learner to develop the agency needed to dismantle oppressive ideology rather than reproduce it (Hoffman, 2009).

**Differing Instructional Environments**

A supportive classroom is one where students feel psychologically safe, accepted, and empowered. They know that they are valued and that their voices matter (Aloni, 2011; Oberle, 2018). Autonomy-supportive classrooms have been associated with positive social, emotional, and academic outcomes in children and can be a protective
factor for potential future issues in social and emotional well-being (Oberle, 2018). A central priority in schools and classrooms must be the enhancement of the social and emotional climate.

Research shows a clear correlation between instructional choices, self-concept, and academic outcomes (Hoffman, 2009; Oberle, 2018; Šouláková et al., 2019). In an ideal classroom, power is shared and students and teachers are seen as equals. This egalitarian structure empowers students by fulfilling their needs for autonomy and leads to instruction through which students feel respected and accepted. Respect and acceptance of the learner’s humanity then leads to the development of a more positive self-concept, which is critical for not only emotional health but also for success as a learner (Aloni, 2011; Millei, 2012; Oberle 2018). This is also supported by Reeve (2009), who purported, “Students of autonomy-supportive teachers display markedly more positive classroom functioning and educational outcomes than do students of controlling teachers” (p. 159).

On the opposing side of supportive, egalitarian instruction is the hierarchical, teacher-controlled instruction that is typically thought of when one thinks of traditional American schooling. The issue of teacher-controlled, hierarchical instruction in schools is situated within a larger systemic context. Reeve (2009) stated that teachers are often controlling during instruction, even though studies show that students benefit the most intellectually and emotionally when teachers support their autonomy and intrinsic regulation. Reeve discussed that a major factor in teachers operating out of a more controlling style is the result of pressure from above. In other words, external, hierarchical control is more culturally valued than supporting autonomy. This cultural
valuing of external control and devaluing of autonomy and intrinsic regulation dates back to the rise of social efficiency doctrines at the height of industrialization and has since become concretized in schools as the most socially accepted and effective form of classroom instructional environment (Casey et al., 2013; Wells, 2017).

In addition, people have been socialized into two highly problematic beliefs: to know who is in control, and to believe that there is a “right” and “wrong” way to do something, consequently creating a culture of fear (Wells, 2017). Control is also highly valued when pressing policies and performance indicators such as high-stakes testing, rewards, and competition are in place (Reeve, 2009). School then becomes a mirror of capitalistic, societal values in which ideologies of social, behavioral, and academic control with the end goal of “coming out on top” are embraced and concretized by the school and classroom structure. This results in the achievement of short-term success at the detriment of long-term social, emotional, and intellectual outcomes.

This systemic culture of control, constant monitoring, and fear creates a lack of trust between student and teacher, which leads to detrimental social, emotional, and academic outcomes for students (Wells, 2017). Children’s education begins with socialization into their communities (Aloni, 2011). Under controlling social conditions, children are effectively being socialized into the dangerous belief that the suppression of their autonomy is the norm and essential to their functioning. This is highly alarming since children’s learning is shaped gradually by their internalization and reproduction of the patterns, procedures, and beliefs they are exposed to across all contexts of their lives (Immordino-Yang et al, 2018).
Student Outcomes of Controlling Instruction

The research is clear on the effects of controlling instructional structures on students’ social, emotional, and academic readiness and outcomes. Assor et al. (2005) stated that controlling teacher practices undermine students’ sense of autonomy and force compliance that produces restricted and superficial academic engagement. According to these authors, teacher-controlled instruction can include constantly giving directives, withholding material or emotional rewards, interfering with each student’s preferred work pace, and not allowing students to voice opinions and make decisions about their learning. These practices undermine students’ sense of autonomy. When autonomy is frustrated, students experience anxiety that they will not be able to be successful in the tasks at hand (Assor et al., 2005).

This breakdown in self-concept and increase of a stress response (anxiety) due to exposure to controlling instruction is alarming given that low self-concept can relate to low self-esteem, which increases vulnerability to psychiatric disorders (Griffioen et al., 2017) and that the early adolescent period of life is a critical period of vulnerability to mental illnesses in that it is a formative social, emotional, and cognitive period for the brain that is triggered by environmental stimuli (Immordino-Yang et al., 2018). Environments of chronic stress such as teacher-controlled, autonomy-frustrating instructional environments are toxic to brain development. Immordino-Yang et al. (2018) explained that an individual’s brain functioning is impacted by the stress experienced from threats to that person’s emotional safety and that this kind of identity-related stress not only affects cognition in the short-term but has been linked to premature degeneration of brain and body functioning in the long-term.
In related research, Reeve and Tseng (2011) found biological evidence of the differing outcomes in controlling or manipulative instruction and autonomy-supportive instruction. They found that exposure to teacher-controlled instruction increased students’ cortisol levels, whereas exposure to autonomy-supportive instruction decreased students’ cortisol levels. Their findings confirm that elevated cortisol levels serve as a biological marker of increased stress that may result from being controlled and may indicate that interpersonal obstruction is occurring, and lower cortisol levels serve as a biological marker of decreased stress that may result from exposure to autonomy-supportive instruction that includes perspective-taking and support (Reeve & Tseng, 2011).

This clear link between teacher-controlled instruction and student stress is critical given that higher levels of school-related stress can lead to mental health problems and poor academic outcomes (Oberle & Schonert-Reichl, 2016). In a study that measured students’ cortisol reactivity in response to teacher stress, Oberle and Schonert-Reichl (2016) found that high levels of occupational stress in teachers resulted in higher levels of cortisol levels in students. This is significant in that high job-related stress hinders a teacher’s ability to form positive relationships with students and often results in depersonalized classroom environments that rely on controlling tactics to manage student behavior (Oberle & Schonert-Reichl, 2016).

**Theoretical Framework**

This action research study was informed by and grounded in humanistic learning theory, cognitive learning theory, and CBT. The theoretical framework for this study was developed by synthesizing theories that relate to the problem of practice. Learner stress and lack of ownership and agency over thought processes were identified as the chief
issues for students, so the theories selected were those that purport to support learner agency, empowerment, and positive self-concept. This section covers how these three theories work together to create the foundation for the development and maintenance of an instructional environment that supports learner agency, empowerment, and positive self-concept. Humanistic learning theory will be discussed first, followed by cognitive learning theory, and then CBT.

In the 1960s, Abraham Maslow and Carl Rogers propelled the humanistic movement in American society (DeCarvalho, 1991). Rogers believed that learning should be student-centered, and Maslow believed that the failure of the American education system was due to behaviorism, writing extensively on the power of intrinsic learning processes as the key to students’ self-actualization (DeCarvalho, 1991).

Humanistic learning theory centers around the belief that individuals have higher needs than simply behavior modification, memorization of information, and execution of response patterns (Bandura, 1982; Maslow, 1968). Further, humanistic education is delineated from more authoritarian education traditions in that it is committed to fostering an instructional climate that protects students’ dignity and agency, rather than utilizing or condoning psychological or physical control to manage dissident students (Aloni, 2011). Likewise, this theory stresses the importance of the educator creating an environment for the student to reach self-actualization by fulfilling the hierarchy of these needs (DeCarvalho, 1991; Maslow, 1968). Additionally, self-efficacy is a central mechanism in human agency and self-actualization, and individuals’ perceptions of their capabilities hinge upon their thought patterns and emotions, thereby influencing learning outcomes (Bandura, 1982; DeCarvalho, 1991). In short, students learn when they seek to actualize

Cognitive learning theory dates to the early 20th century (Yilmaz, 2011). According to Yilmaz (2011), the work of Edward Chase Tolman, Jean Piaget, Lev Vygotsky, and Jerome Bruner were key in shifting beliefs about human learning from behaviorism to cognitivism and it is the work of Piaget and Vygotsky, specifically, that makes up the foundation of cognitivism as it is widely practiced today. The basis of cognitive learning theory is similar to the humanistic belief that awareness, understanding, and action upon internal thought processes are what help people to learn. According to Piaget (1970), learners are continually accommodating different schemas as they experience new information and stimuli. It is from those experiences that they use their internal self-regulatory processes to either ignore new learning and keep their original schema and understandings, try to assimilate the new information with the previously held schema, or form a new, modified schema to explain and synthesize all information and experiences (Piaget, 1970). In the classroom, this means that rather than relying on external forces, motivations, or conditioning, learning behaviors are built through reflective cognitive activities (Clark, 2018). In this view, intellectual competence is achieved by the utilization of internal processes such as thinking, remembering, perceiving, interpreting, reasoning, and problem-solving (Clark, 2018; Pritchard, 2017). For Piaget, cognitive learning was a matter of trying to achieve equilibrium in cognitive responses to stimuli through one of those three ways to interpret schema.
For Vygotsky (1978), cognitive processes were about dialogue with the learning environment. Vygotsky postulated in his general law of genetic development that social stimuli affect the regulation of one’s behavior and that one can think in innovative ways because of social stimuli. In the modern-day classroom, this might look like students being able to understand how social and environmental stimuli affect their learning processes and being able to identify and implement a strategy for self-regulating their behavioral and emotional responses related to learning.

CBT has theoretical links to the ideas of both humanistic learning theory and cognitive learning theory. According to Leder (2017), CBT was first posited by Albert Ellis and Aaron T. Beck in the 1960s. The theory behind CBT is that external and internal stimuli are all filtered through a meaning-making process based on the beliefs that are available to the individual (Leder, 2017). From there, the individual then has a response to a situation or stimuli based on the way the person interpreted the event because of the available beliefs (J. S. Beck & Fleming, 2021).

In A. T. Beck’s early work with developing CBT, he discovered that when he taught his patients to autonomously recognize and change their distorted interpretations, they not only felt better but they were able to modify their interpretations and beliefs in the long-term and effectively produce new, less distorted and more adaptative thought patterns (J. S. Beck & Fleming, 2016). Thoughts and core beliefs direct all cognitive activity; therefore, A. T. Beck (as cited in Leder, 2017) saw the modification of thoughts as playing the chief role in both the development and mitigation of dysfunctional or maladaptive psychological states. Through this modification of thought patterns as
opposed to trying to control behaviors, individuals can more effectively change their beliefs to exercise agency over the regulation of their behavioral responses to stimuli.

The present study used these three theoretical underpinnings to investigate the idea that a student’s academic readiness is mediated by the student’s ability to act autonomously to regulate emotions and behaviors in response to stimuli to create a desirable environment for learning. Humanistic learning theory also supported this effort in ensuring that the power for this regulation of emotional and behavioral responses to academic stimuli is driven by students and merely facilitated by the interventionist. The tenets of these three theories in concert framed the study in the perspective that students are autonomous beings who can act with agency and thoughtfulness to drive their environments for learning. The purpose of the intervention in this study was to shift the power in the instructional experience from teacher-controlled to student-controlled. This directly rejects behaviorist and societal views that learning is dependent on external behavior control.

**Psychologically Supportive Instruction**

Students who struggle with emotional and behavioral regulation are more likely to perform worse academically (Hoffman, 2009; Stran et al., 2020). Studies over the past decade have clearly shown the link between emotional regulation skills and academic readiness and outcomes. Data show that the “ability to self-regulate is associated with a range of academic, health, and behavioral outcomes, including predicting higher social engagement, attention, and academic achievement” (Stran et al., 2020, p. 262) not only in the short-term but in the case of their behaviors into adulthood as well (Šouláková et al., 2019; Stran et al., 2020).
In an analysis of the impact of social-emotional learning programs on 270,034 students in kindergarten through high school, Durlak et al. (2011) found an 11% gain in academic outcomes in social-emotional learning participants over students who did not participate in social-emotional learning programs. Corcoran et al. (2018) also found that social-emotional learning interventions yielded a positive effect on reading, math, and science outcomes. The findings of these two studies are unsurprising, given that emotional processes affect learning (Durlak et al., 2011); consequently, social-emotional learning aims to establish safe and supportive learning environments and to foster social and emotional competencies (SECs) including the abilities to understand and manage emotions, set and achieve positive goals, feel and show caring and concern for others, establish and maintain positive relationships, and make responsible decisions. (Mahoney et al., 2020, p. 2)

Self-esteem is linked closely to managing emotions, goal setting, and the mastery of other cognitive and emotional-affective skills and can explain variation in elementary schoolers’ academic outcomes. In one study of historically disenfranchised elementary school students, Denham and Brown (2010) found that students who displayed more resilient mathematics outcomes were the students with higher self-esteem and higher self-perceived academic competence. This suggests that the social-emotional competency of self-awareness, or perceived self-competence due to high self-esteem, is foundational to academic success.
Cognitive psychology interventions that involve identifying patterns of thinking, behavior, and emotions—such as those common in CBT—can positively affect emotional, cognitive, and behavioral outcomes for all students, including those who do not struggle as much with emotional regulation as others (Stallard et al., 2014). This is a logical connection since instruction that is structured to be consistent with brain development intentionally situates students’ social-emotional needs as the central priority of the learning experience (Immordino-Yang et al., 2018). Stran et al. (2020) cited the importance of self-regulatory skills for emotion and behavior for all children, noting that psychological interventions for these skills typically are only addressed for students with “normative deficits” (p. 262) in these areas. It is problematic to ignore students who do not appear to struggle with these aspects of cognitive and affective functioning.

Psychologically supportive instruction is a critical component of education. A vital part of psychologically supportive instruction is positive student-teacher relationships, which have proven to be a protective factor regarding students’ mental health, self-esteem, academic outcomes, and adjustment to school (Hamre & Pianta, 2001; Oberle, 2018; Oberle & Schonert-Reichl, 2016). Instructionally-based psychological interventions that can be brought directly to students as part of instruction are effective in that they help promote positive teacher-student relationships (Šouláková et al., 2019). This is critical information given that the classroom is “one of the most important ecological contexts that shape early adolescents’ development, health, and well-being in school and life” (Oberle, 2018, p. 101) and that negative emotional effects can be buffered through a supportive instructional environment (Immordino-Yang et al., 2018).
Instruction that promotes social and emotional skills is critical to providing students with the psychological support necessary to help them cope effectively with academic stress. Sotardi (2016) suggested employing daily measures in instruction that help students identify and manage stressors, including utilizing clinical approaches such as those found in CBT to provide students with coping strategies that will enable them to cope with stress and strengthen their social-emotional competency.

**Social-Emotional Learning Overview**

As defined earlier, the premise of social-emotional learning is to establish safe and supportive contexts for learning to nurture students’ social-emotional competencies by explicitly teaching them strategies for emotional regulation, displaying empathy and compassion for themselves and others, maintaining healthy relationships, and responsible decision-making (Mahoney et al., 2020). For a social-emotional learning program to be recommended by CASEL (2019b), it must be a classroom-based program that supports students’ social-emotional competencies, allows practice opportunities, and can be carried over multiple years. In addition, the program must include ongoing teacher support and at least one evidence-based assessment that documents the impact of the program on students (Shah, 2012).

According to CASEL (2019b), the five intertwined cognitive, affective, and behavioral competencies that an effective social-emotional learning program should promote are self-awareness, self-management, social awareness, relationships, and responsible decision-making (Mahoney et al., 2020; Shah, 2012). Understanding and managing emotions is essential to students achieving these social-emotional competencies (Mahoney et al., 2020; Norris, 2003), as well as successful academic
outcomes, given the role that emotional processes play in impeding or facilitating learning (Durlak et al., 2011).

Shah (2012) pointed out that an upside of having many quality social-emotional learning program options is that there is great variation in the amount of time schools perceive to have to devote to social-emotional learning programs, and having options with different timelines affords schools the opportunity to utilize these programs despite possible constraints. Perceived time constraints are an issue for the implementation of successful instruction of any subject or skill in the classroom. Teachers’ perceptions of their available instructional time affect their pedagogical decisions (Teig et al., 2019). Teachers actively choose which content to prioritize, include, or exclude based on several factors such as school curriculum and expectations from administrators, as well as other social and institutional conditions (Teig et al., 2019). Teachers’ perceptions of available time will impact their perceptions of the value of the social-emotional learning programs they are being asked to implement. If they perceive programs to be unreasonable to implement based on the amount of time required, implementation will not be successful (Brackett et al., 2012; Forman & Barakat, 2011; Hoffman, 2009).

Teig et al. (2019) argued that perceived time constraints serve as a condition that can determine a teacher’s implementation of cognitive activation strategies in the classroom. It can be concluded reasonably from here that merely having multiple program options is inadequate if the issue of perceived available time leads to a devaluing and deprioritizing of social-emotional learning. People prioritize that which they value (Bandura, 1982). The question, then, becomes two-fold: What conditions need to be present for a teacher to arrive at a willingness to prioritize social-emotional learning? If a
teacher or school perceives a program to be too time-consuming, then what is a more efficacious way for true social-emotional competency development to be implemented successfully in the classroom?

This gap between the aims and actualization of social-emotional learning in schools can be addressed by thinking about the idea that although there are many social-emotional learning programs, social-emotional learning itself is not a program. This is why there are a multitude of strategies that support the development of students’ social emotional competencies (Norris, 2003). Mahoney et al. (2020) stated that social-emotional learning efforts must receive school-wide support to be fully effective; however, many teachers revert to fragmented approaches to social-emotional competency development in their classrooms. In a report for CASEL, less than half (44%) of teachers surveyed reported that social-emotional skills are being implemented on a school-wide basis in their schools, stating that the biggest challenge is time (Bridgeland et al., 2013).

Much of the literature stands firm in the assertion that effective implementation of social-emotional learning requires a school-wide, systemic approach with ongoing teacher professional development and coaching (Hoffman, 2009; Mahoney et al., 2020); however, Bridgeland et al. (2013) noted the lack of literature analyzing the effect of individual or ad hoc teacher efforts against school-wide programming. This is a critical gap that further research needs to bridge given the assertion that “there is likely to be more generalization and maintenance of social-emotional learning skills when they are embedded into other academic subjects” (Mahoney et al., 2020, p. 7).

CASEL Chief Knowledge Officer Roger Weissberg (2019), who was one of the researchers who helped to establish the organization, discussed that something he would
do differently is to approach the work from a practitioner standpoint first, as opposed to a researcher perspective: “If I were to do things differently, I would spend even more time in schools . . . Collaborative community action research produces the most impact when you work with diverse groups of people who are willing to challenge you and cocreate best practices and policies” (as cited in Weissberg, 2019, p. 68). He further explained that taking a practitioner-researcher stance as opposed to a researcher-practitioner approach would be more beneficial in understanding how to implement SEL in real classrooms.

This reflection is significant and the present study addressed this gap in research and shifted the practice of social-emotional learning toward a practitioner perspective first, which can shed light on potentially effective social-emotional learning practices that are not currently being prioritized by the major voices in social-emotional learning programmatic efforts. As Mahoney et al. (2020) stated, “The school setting permits teachers to know their students well, allowing SEL instruction to be personalized and culturally responsive, and for teachers to prompt and reinforce SECs in appropriate contexts” (p. 7). In this regard, it is logical for practitioners to drive continuous social-emotional learning reform and implementation efforts in the microcosms of their personal classrooms and instructional practice.

**Cognitive Behavioral Therapy Strategies as Social-Emotional Learning Practice**

Cognitive behavioral therapy strategies as a social-emotional learning practice fall under the category of an individual practitioner effort in building students’ social-emotional competencies. CBT, the most widely studied form of psychotherapy (Hofmann et al., 2012; Leder, 2017), is based on the premise that the way an individual thinks or feels affects how that person responds to a situation or stimuli. The goal is to change the
individual’s thought patterns so that the person can effectively cope with difficult
cognitive and emotional situations (J. S. Beck & Fleming, 2021; Leder, 2017).

Utilizing CBT strategies to manage thoughts and emotions is appropriate for
people of all ages including children, and has been found to be moderately to highly
effective in the treatment of a plethora of psychopathologies, including general stress
found CBT was the most effective treatment for stress management; this is a critical
connection given the stress response that an undesirable school environment elicits in
students (Griffioen et al., 2017; Oberle & Schonert-Reichl, 2016; Reeve & Tseng, 2011).
In a randomized controlled trial on the effect of a school-based CBT program on
elementary schoolers, Starrenburg et al. (2017) found that there was a significantly
greater decrease in students’ self-reported anxiety levels for CBT group than for those
who did not receive the intervention.

Uncomfortable emotions and cognitive distortions elicited by a mathematics task
can be referred to as math anxiety. In another study evaluating the effectiveness of CBT
on reducing math anxiety in elementary school students, findings showed that
participants who received the interventions reported significantly decreased math anxiety
and higher math self-concept than the group who did not receive the intervention
(Asanjarani & Zarebahramabadi, 2021). This is not surprising since the more students
understand their cognitions and emotions, the more successful they are with learning
tasks (Denham & Brown 2010; Immordino-Yang et al., 2018).

Many other studies have cited the effectiveness of utilizing CBT skills in the
classroom to promote social-emotional competency development, increased emotional
and behavioral functioning, and positive academic outcomes (e.g., Forman & Barakat, 2011; Šouláková et al., 2019; Stallard et al., 2014; Stran et al., 2020). CBT as a set of social-emotional learning strategies is a logical fit given that CBT interventions combine various cognitive, emotional, and behavioral strategies that invite the individual to be an active participant in the problem-solving process to mitigate maladaptive emotional and behavioral response patterns (Hofman et al., 2012), thereby lessening the impact of the stimuli causing uncomfortable emotional states and strengthening the individual’s social-emotional competencies. For example, the social-emotional competency of self-awareness includes identifying and labeling one’s feelings, and the social-emotional competency of self-management “includes the ability to handle one’s emotions in productive ways, being aware of feelings, monitoring them, and modifying them when necessary” (Denham & Brown, 2010, p. 656). This is not only the premise of CBT but is also aligned with the science of brain development that supports providing strategies and opportunities for flexible thinking as essential to the maintenance of a productive learning environment (Immordino-Yang et al., 2018). Furthermore, social-emotional competency development depends on the ability to “coordinate cognition, affect, and behavior that allows individuals to thrive in diverse cultures and contexts and achieve specific tasks and positive developmental outcomes” (Mahoney et al., 2020, p. 4), further justifying why CBT is a powerful tool for effective social-emotional learning.

The purpose of CBT empowering individuals as active participants in their emotional regulation processes and goals is so that they learn how to improve their situations by adjusting their thinking across various everyday situations and environments (Asanjarani & Zarebahramabadi, 2021). The connection to social-emotional learning is
clear here, as Durlak et al. (2011) warned that for social-emotional interventions in schools to gain widespread acceptance, they must prove effective under practical, real-world conditions.

Cognitive behavioral therapy has already proven to be transferable across contexts and effective under real-world conditions (Hofmann et al., 2012), and it has gained acceptance and respect in the field of psychology. The transferability of skills and ease of application across contexts aids in effective social-emotional learning implementation in schools, which is important because of the necessity for targeted approaches to be integrated with universal approaches to meet the needs of each student (Mahoney et al., 2020). Concerning the effectiveness of implementation, Durlak et al. (2011) found that social-emotional learning can be incorporated effectively into routine practice, and social-emotional learning strategies for building students’ social-emotional competencies can be delivered successfully by practitioners.

**Implementation**

The use of evidence-based, cognitive behavioral strategies as a social-emotional learning practice remains low in schools even though several successful interventions have been developed that are appropriate for use within instruction. Cognitive behavioral interventions are concerned with teaching students how to focus on the use of cognitive restructuring to manage emotions to reduce the intensity of problems or prevent problems altogether (Forman & Barakat, 2011). These interventions can be integrated seamlessly into the classroom and present a benefit to all students (Stran et al., 2020). According to CASEL (2019b), one of the four main ways social-emotional competencies are developed is through integration into academic instruction. Two factors that emerge from the
literature as key components that affect successful implementation are characteristics of the program practiced and teacher beliefs (Brackett et al., 2012; Forman & Barakat, 2011; Hoffman, 2009).

Interventions that seem like a risk to a school or teacher’s values or everyday teaching practices are less likely to be successful (Forman & Barakat, 2011). These perceptions hinge largely on a teacher’s comfort with the intervention and commitment to learning about social-emotional learning, as well as whether the school culture is supportive of social-emotional learning (Brackett et al., 2012). Because teachers are the primary delivery method of social-emotional learning interventions, their attitudes about social-emotional learning and their own psychological readiness to implement such interventions can impact the sustainability and overall effectiveness of these interventions (Brackett et al., 2012). The characteristics of the interventions start to matter more in this case as well in that often, teachers feel comfortable implementing a separate program or activity, such as a morning meeting or group share, but struggle to infuse psychological intervention strategies into academic instructional time (Ferreira et al., 2020).

For teachers to be able to effectively embed social-emotional learning into their minute-by-minute instruction rather than teaching it as a separate subject, deeper philosophical and psychological beliefs must be addressed to avoid a surface-level application of the psychological intervention (Freiberg et al., 2020; Hoffman, 2009). Hoffman (2009) warned that many social-emotional learning programs focus on the importance of caring relationships between teachers and students; however, when that philosophy is applied to practice, the focus on feelings morphs into form and structure, becoming more about following rules and making good choices rather than developing a
language of feelings or emotional connectedness (Hoffman, 2009). In other words, social-emotional learning gets hijacked by socially dominant, culturally valued teacher-controlled instructional practices, effectively devolving social-emotional learning into another form of psychological control rather than an emancipatory, humanistic practice that gives the learner power, agency, voice, and value.

To avoid this conflation of ideals, the teacher implementing the intervention must possess the necessary attitudes and skills to carry it out successfully (Ferreira et al., 2020). Furthermore, considering that the effective promotion of psychological skills in the classroom involves emotional and behavioral modeling, the teacher’s beliefs must align with the true philosophy and goals of social-emotional learning (Brackett et al., 2012; Ferreira et al., 2020). Teachers must not only be socially and emotionally competent themselves, but also acutely aware of how social and cultural factors including their school environments and their positionality will affect the implementation and sustainability of the intervention and overall instructional decisions (Mahoney et al., 2020).

**Assessment of Instructionally Embedded Psychological Interventions**

In addition to teachers knowing how to explicitly teach and model social-emotional skills such as cognitive reframing every day and throughout every subject, they must also know how to assess student progress toward target skill development (Ferreira et al., 2020). Like academic assessments, social-emotional learning assessments provide information to identify areas of strength and need, and guide teaching and learning accordingly (McKown, 2019). Assessments should be both formative and summative, and match the learning targets that were developed before the intervention was delivered.
Students should also be made aware of assessment criteria so that they can monitor their progress toward the skill target (Ferreira et al., 2020).

Formative assessment is particularly important in social-emotional learning because it allows for student involvement and continuous alliance between student and teacher, modeling for the student that feedback and communication are central elements to self-regulation and the overall learning process (Carless, 2006; Nicol & Macfarlane-Dick, 2006). Formative assessment improves both teacher practice and student learning, and should be considered a fundamental piece of well-regulated instruction (Ferreira et al., 2020). Formative assessment is critical in that it naturally allows conditions for continuous self-reflection and the development of autonomy. Formative assessment of psychological skills can include observation, self-reflection cards, positive and specific feedback, a portfolio, sharing, journaling, and setting learning intentions and criteria for success (Wiliam, 2011).

Summative assessment can also provide useful data in determining a student’s social-emotional competency at the beginning of and after the deployment of a psychological intervention. Further, having multiple forms of assessment is important to the internal validity of a study (Efron & Ravid, 2013; Merriam & Tisdell, 2016). The most common methods of summative assessment are self-report, rating scales, direct assessment (McKown, 2019), and interviews (CASEL, 2019a).

A self-report often involves having students rate their own social-emotional competence and psychological states based on a series of statements. This allows students to communicate their views of their psychological strengths and weaknesses. This is telling because often their answers reveal something about their perceptions of self as
related to key competencies, such as self-efficacy and self-concept (McKown, 2019).

Limitations of self-report include students completing answers based on what they think is most desirable rather than accurate self-assessments, as well as students not possessing the level of self-awareness necessary to provide an accurate assessments of themselves (Crowne & Marlowe, 1960). Another limitation of self-report is memory effects (CASEL, 2019a). In other words, a student may not be able to accurately sequence and recall behaviors and actions.

Rating scales involve a teacher completing a series of statements about a student’s social-emotional competence based on observations of the student. This method could be more advantageous in assessing younger students who do not yet possess the required literacy skills or self-awareness to accurately complete a self-report (CASEL, 2019a). A limitation of the rating scale is that a teacher’s assessment of a student may be biased by feelings about that student, thus affecting scoring of the student’s psychological competencies in the same way that a teacher’s negative perception of a student has a direct correlation to student grades, test scores, and work habits (Hamre & Pianta, 2001). Other limitations include being a burden for the teacher or administrator and the potential to misattribute or misinterpret behavior (CASEL, 2019a).

Direct assessment is another way to assess social-emotional competencies. This type of assessment, also referred to as performance assessment, involves students engaging in a challenging social-emotional task or activity to demonstrate their psychological competencies. This is a more unbiased form of assessment as compared to self-report and rating scales, as it does not depend on subjective judgment (CASEL, 2019a; McKown, 2019). A limitation to this assessment method is that it is better suited
to assess social competencies rather than emotional skills, so it may not be appropriate for all social-emotional learning assessment situations (McKown, 2019).

Interviews are useful in that assessors can glean a more in-depth and complex response as opposed to the other assessment methods. They can identify issues and themes that may not be captured from the other forms of reporting, and they do not rely on reading ability as self-report does. Nevertheless, interviews face the same limitation as other reports such as memory effects, social biases, and the possibility of faking (CASEL, 2019a).

**Opposing Viewpoints**

Opponents of social-emotional learning are not necessarily opposed to social and emotional skills having a space in education. They acknowledge the need for and importance of people being socially and emotionally competent but have many concerns related to the way social-emotional learning has been conceptualized and implemented as an educational practice over the past two decades. Finn and Hess (2019) offered several caveats for social-emotional learning implementation including not allowing social-emotional learning to replace academics, being clear about what social-emotional learning is and is not, ensuring that there are reliable metrics to measure social-emotional learning outcomes, and slowing down and “getting it right.” They discussed issues with half-baked implementation efforts which, as reported by teachers in other studies (e.g., Bridgeland et al., 2013), are already happening. A desire to focus on rapid implementation confounds the purpose of social-emotional learning and it can easily devolve into surface-level attempts at helping students to feel good about themselves.

Another valid concern is the reliability of data being reported about the effectiveness of social-emotional learning programming. Since researchers often tend to
pursue work that gets funded, the focus is on large data sets with causal findings broadly applied, yet the actual work of examining how well something is being implemented gets dismissed (Finn & Hess, 2019). Therefore, practitioner-driven action research studies in specific localized contexts, such as the present study, are critically important to the reliability, trustworthiness, and true effectiveness of social-emotional learning practices.

Summary

Teacher-controlled instruction is an issue that undermines students learning, as evidenced by the student stress response and negative academic outcomes of the controlling instructional practices on students’ autonomy, self-concept, and ability to self-regulate. Given the historical, systemic entrenchment of controlling teacher and school practices in schools, mitigating this issue by focusing on changing instructional practices and school climate through professional development or by implementing a new social-emotional learning program has proven difficult. This is due to a myriad of factors such as teacher resistance, perceived available time, the sheer nature of the time it takes to change systemic beliefs of practices, and a disconnect between the tenets of traditional social-emotional learning programs and pressure from administrators, parents, and the community to manage student learning through socially accepted hierarchical, adult-controlled methods.

Embedding evidence-based cognitive behavioral therapy strategies into instruction to support students’ social-emotional competency development by teaching them how to identify and interrupt patterns of cognitive distortions can be a less fragmented and more sustainable way to strengthen students’ social-emotional competencies. It would serve as a complement to academic development, rather than
replace it. It is also easy for teachers to learn, model, and utilize during instruction, and growth is measurable.

Cognitive behavioral therapy skills are also transferable across various settings. If students see multiple teachers through the course of their school day and not every teacher teaches CBT skills, it is okay because students’ use of the strategies to regulate their emotions and behavior and mitigate their stress is not dependent on the teacher. CBT strategies put the power of emotional and behavioral regulation in the hands of the individual who is employing them. Through this empowerment, individuals can autonomously take control of their own self-awareness, self-management, social awareness, relationships, and responsible decision-making despite potential negative environmental conditions they find themselves in.

Conclusively, using CBT strategies to shift from teacher-controlled instruction to student-centered instruction supports learner agency, autonomy, and the intrinsic regulation of their emotional responses to academic stimuli, and also empowers students to independently build more positive academic self-concepts. This connects to the main tenets of humanistic learning theory and cognitive learning theory. Building instruction around CBT strategies means the teacher sees students as autonomous, capable beings (humanistic learning theory) central to the instructional process who are competent to recognize and manage their emotions and thought processes and can reconstruct thoughts and beliefs (cognitive learning theory) to actualize the goal of creating desirable academic learning environments through the mediating process of positive self-concept development.
CHAPTER 3
STUDY DESIGN AND METHODS

The problem of practice for this study was that many students lack the skills necessary to regulate uncomfortable emotions caused by academic stressors and to maintain positive perceptions of their academic competence. This gap in the development of their social and emotional competencies results in a thwarted ability to self-regulate, maintain a positive self-concept, and sustain positive perceptions of academic competence. The purpose of this study was to investigate the impact of integrating CBT strategies into math intervention instruction.

This research study was informed by tenets of humanistic learning theory, cognitive learning theory, and cognitive behavioral therapy, and combined key ideas from the three to frame an investigation of the effect of a cognitive and emotional-affective intervention on students’ social-emotional competencies and perceptions of academic achievement and competence. This theoretical framework supported the study’s aim to empower learner agency, self-efficacy, and cognitive awareness so that students could learn how to mediate their emotional responses to academic stressors and have more ownership and control over producing desirable mathematical competence. Consequently, this framework informed both the research questions for this study and the choice of intervention. The following questions guided this study:

1. What are students’ self-beliefs about their mathematical competence?
2. How do students’ self-beliefs about their mathematical competence affect their agency and autonomy over their learning?

3. How does the integration of cognitive reframing in math instruction impact third and fourth grade students’ perceptions of their own mathematical achievements and competence?

This chapter consists of an in-depth explanation of the qualitative research design of this study. It covers the intervention design, data collection instruments, data analysis methods, and theories that grounded and informed the study. Also explained in depth are the demographics of participants, the role of the researcher and how the two interact.

**Research Design**

This study followed a qualitative action research design guided by principles of narrative inquiry as the basis for data collection, data analysis, and generation of claims. The last three questions in the final data collection instrument—post-intervention semi-structured interviews (see Appendix B)—were guided by the humanistic learning theory idea of empowering student agency over their learning outcomes.

Action research addresses a specific problem of practice by taking actions that produce outcomes that lead to changes within a setting, the participants of the study, or the researchers themselves (Efron & Ravid, 2013; Herr & Anderson, 2015; Ma et al., 2018). The present study sought to produce changes in the participants, but there were also important implications for the setting and the researcher. This action research study drew heavily on narrative inquiry as the justification for the study design as well as the choices of data collection instruments. In narrative inquiry, meaning making is actualized through the stories people choose to tell and the contexts that shape both their lived
experiences and the stories they choose to put out into the world (Merriam & Tisdell, 2016). Satchwell et al. (2020) asserted that making meaning is the goal of any form of qualitative research. Utilizing narrative inquiry for this meaning-making encompasses the cognitive, social, and emotional-affective domains of the human experience (Merriam & Tisdell, 2016), which parallels the aims of this study in investigating the problem of students’ maladaptive emotional responses to mathematical learning. This type of inquiry is a powerful force for generating claims and constructing knowledge about an experience or problem in a particular setting.

A qualitative action research study shaped by narrative inquiry was the best choice for this endeavor because it aligns with the goal of centering participant perspective and knowledge to bring about change. In action research, the goal is to yield actionable outcomes through systematic inquiry that produces new data-supported knowledge about a phenomenon in a specific context (Belzer & Ryan, 2013; Efron & Ravid, 2013; Herr and Anderson, 2015; Ma et al., 2018; Rust & Meyers, 2003).

This action research study met quality action research criteria in that asked very specific, situational questions that sought to investigate the impact of cognitive reframing on students’ observed maladaptive emotional responses to mathematical learning. Also in alignment with quality criteria for action research, the question was derived from the researcher’s personal concerns about students and aligns with current issues in the field of education of best practices for instructional intervention and making academic content more accessible for all students. The chosen research methods provided an avenue to examine the problem of practice thoughtfully and systematically and the resulting data were appropriate for ongoing, cyclical action research exploration.
**Intervention**

For this study, the CBT intervention of cognitive reframing was integrated into instruction to determine its impact on students’ mathematical self-concepts. The purpose of cognitive reframing is to identify distorted or maladaptive thought patterns and intentionally reframe those thoughts to produce more realistic, adaptive thought patterns (Pipas & Pepper, 2021). Students were asked to use this strategy to identify moments during learning that they needed to reframe self-narratives about their mathematical self-beliefs.

Students were provided with an example of the cognitive reframing strategy practiced throughout this intervention (see Appendix B). They used a Google Form to record their negative or irrational thoughts about their math abilities, their reframed thoughts, and their exit tickets on reshaping their thoughts. Informed by teacher observations, patterns emerging from field notes, and the student exit ticket data after the first 2 weeks of practicing the intervention, it was determined that students needed additional support. Consequently, personal strategy cards were created as a guide for the remainder of the intervention. The specific procedure for this intervention is delineated later in this chapter. The effectiveness of the intervention was measured with the data collection and analysis methods also described later in this chapter.

This intervention ultimately aimed to mitigate the problem of practice by empowering student voice and ownership over cognitive- and emotional-affective processes that are activated during learning. This interventional strategy encompasses tenets of humanistic learning theory, cognitive learning theory, and cognitive behavioral therapy in that it asks students to focus on their thought processes and emotions during
the learning process and gives them the agency to regulate those emotions and shape those thought processes in a way aimed to produce more desirable academic and emotional outcomes. Using cognitive reframing to mitigate students’ maladaptive emotional responses to mathematical learning is empowering of student voice and agency (humanistic learning theory) and is driven by the interrogation and reshaping of internal thought processes and emotional response patterns (cognitive learning theory).

**Participants**

As a math academic support teacher in an elementary school, I purposefully sampled from my third and fourth grade students because early adolescence is a critical age for the development of identity, self-concept, and self-regulation (Erickson, 1968). It is also when students at my school generally begin to be held more responsible for their social, emotional, and academic functioning and outcomes. All students in the participation pool were identified as needing instructional intervention based on district criteria. Some participants had 504 behavioral plans in place, but none received special education services.

In this case, the research participants were purposefully sampled from my students who had previously mentioned issues related to being stressed or anxious because of math and students who had not reported it but have had observable, patterned signs signifying stress or anxiety during learning. According to Merriam and Tisdell (2016), purposeful sampling in a qualitative study enables the researcher to derive an in-depth understanding of the issues that are central to the inquiry because it provides the researcher with information-rich cases. This type of sampling also aligns with quality criteria for action research in that it helps to investigate a specific problem within a
specific group (Efron & Ravid, 2013; Ma et al., 2018). These specific selection criteria were chosen because this study sought to gain insight into a specific phenomenon.

The number of participants was determined by parental and student consent. During the study period, I supported nine students in third grade and 11 in fourth grade. Four of the fourth graders and one third grader were multilingual students and were omitted from the participant pool because of their emerging English language proficiency. That left 15 students in the sample for this study. This was an ideal number in that it provided enough but not too much data. Merriam and Tisdell (2016) cautioned against having so many participants that the data become too saturated.

Parental permission was requested through a signed consent form after institutional approval was granted (see Appendix A). Parents were presented with a rationale for the study and lines of communication were open throughout. I did not foresee any parental resistance to the study. No potential risks to participants were identified; however, one parent did not give consent for a child to participate. Consequently, 14 students made up the final participant pool: six fourth graders and eight third graders, which consisted of five males and nine females. Two participants had 504 plans. All participants were either reluctant math learners or displayed or verbalized some sort of stress or avoidant behaviors related to math prior to being chosen for the intervention.

Participant assent was also obtained verbally before semi-structured interview questions started. This assent was audio-recorded. I also did not foresee any issues of student resistance; however, I was mindful that due to the emotional vulnerability required to self-reflect and be open and honest about the effects of emotions, it was
possible that some students could become resistant or hesitant during the study. It was also clear on the parental consent form and stated clearly to students during the pre-intervention semi-structured interviews that participants could withdraw from the study at any time.

Positionality is also important to consider regarding the participants in this study. As a teacher, I am in a socially-constructed position of power. Students have been enculturated into the idea that the teacher being in charge is a social norm of schooling and that they must know and maintain their own place in the hierarchy of the school culture by being compliant with people in power (Broom, 2015; Casey et al., 2013; Wells, 2017). I had already designed my instruction and management around sharing power with students but had to ensure that I continued to do that during this study so that I was able to maintain an environment where students felt safe exercising autonomy over their emotional regulation processes. Participants also differed demographically from myself. I am White, middle class, monolingual English speaker and the participants were predominately Hispanic/Latino, Asian, Black/African American, middle to working class, and multilingual with full English proficiency but another language spoken primarily at home. This positioned me in a socially constructed position of power as well, which affects the way I experience the world versus how my students experience the world. I had to remember that the marginalization they experience in society has affected and will affect them in ways that I have not been affected; I had to be continually aware of this a potential factor in the outcomes of the study.
**Procedure**

The study took place over 8 weeks. The purpose of the intervention was to construct knowledge about students as a whole body, not to form specific case studies.

Table 3.1 shows a timetable for the intervention.

**Table 3.1 Study Timetable**

<table>
<thead>
<tr>
<th>Weeks</th>
<th>Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2 Pre-intervention</td>
<td>• Secured informed assent and consent from participants and guardians</td>
</tr>
<tr>
<td></td>
<td>• Conducted semi-structured interviews</td>
</tr>
<tr>
<td></td>
<td>• Analyzed data to ensure that planned intervention was still appropriate</td>
</tr>
<tr>
<td>3-4</td>
<td>• Taught students how to use strategy</td>
</tr>
<tr>
<td></td>
<td>• Closely observed and reminded students of strategy as needed as instruction was happening. Collected field notes of observations</td>
</tr>
<tr>
<td></td>
<td>• Collected student reflections after each lesson via Google Form</td>
</tr>
<tr>
<td></td>
<td>• Analyzed data from exit slips to inform intervention for weeks 5-6</td>
</tr>
<tr>
<td>5-6</td>
<td>• Continued with cognitive reframing, or worked with students to develop a new strategy that would work better for them if they did not believe cognitive reframing had been helpful</td>
</tr>
<tr>
<td></td>
<td>• Closely observed and reminded students of strategy as needed as instruction was happening. Continued to document field notes</td>
</tr>
<tr>
<td></td>
<td>• Collected student reflections after each lesson via Google Form</td>
</tr>
<tr>
<td>7-8 Post-intervention</td>
<td>• Conducted post-intervention semi-structured interviews</td>
</tr>
<tr>
<td></td>
<td>• Analyzed data from interviews and student reflections</td>
</tr>
</tbody>
</table>

For Phase I of this study, I conducted semi-structured interviews with each student. Students were asked the questions in the Semi-Structured Interview Protocol (see Appendix B). Depending on their answers to the structured questions, I asked them to elaborate or give examples. Sometimes I asked them a different, unplanned question that was related to the structured question. For example, if they said that they hated learning, I asked why. I might have then asked whether they only hated learning in school or if they hated all types of learning. I asked the unplanned follow-up questions to gain a more holistic understanding of their feelings about school and learning and to give them more
opportunities to reflect and explain how they felt since likely they had not spend much
time explicitly thinking and reflecting on this.

Once all participants were interviewed, I transcribed the data and coded it by
topic. The themes that arose from these codes—math is stressful and self-belief is
dependent upon external factors—showed that initial thoughts to use cognitive reframing
as the intervention strategy was appropriate.

Phase II began once pre-intervention semi-structured interviews were completed
and the data from those interviews were coded. On day 1 of this phase, I directly taught
the participants the cognitive reframing lemonade strategy (see Appendix C). The format
for the strategy was adopted from Mindful and Kind Counseling (Ross, 2021) to
explicitly teach students how to reflect on negative or irrational thoughts and to reframe
those thoughts in a way that supports their self-beliefs. Margaret Ross, the author of this
resource, is a licensed professional counselor (New Jersey Department of Consumer
Affairs, 2023). It is called lemonade as a child-friendly way to remember that the idea of
reframing thoughts is like turning lemons into lemonade. Ross created the lemonade
strategy using dialectical behavior therapy as the clinical justification for its validity
(Ross, 2023). Dialectical behavior therapy is a form of CBT that specifically focuses, in
part, on strategies for managing intense emotions. It was developed by Marsha Linehan
in the 1970s and has been found effective in supporting students’ emotional regulation
and self-concept when implemented in school settings (Flynn et al., 2019; Katz et al.,
2020).

Participants were shown the Google Form that they would be completing at the
end of each class. I modeled how to use the form and apply the strategy by talking them
through a personal example. Then, they each practiced this for themselves. I told them to think back over the past week and choose anything they had a negative thought about (it did not necessarily have to be math) and to use the form to complete the steps to help them reframe their thoughts into something more positive, rational, and helpful. Table 3.2 shows this strategy in each intervention phase.

Table 3.2 Intervention Strategies

<table>
<thead>
<tr>
<th>Week</th>
<th>Strategies and Practices</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2 Phases I</td>
<td>• Conducted pre-intervention semi-structured interviews with participants and analyzed data to determine the appropriateness of the planned intervention</td>
</tr>
</tbody>
</table>
| 3-4 Phases II | • Taught students cognitive reframing strategy  
• Reminded students of strategy during the lesson when they showed signs (body language or verbal statement of frustration or anxiety) of a negative experience with the math concept  
• Participants practiced the strategy at the end of each lesson via a Google Form  
• Analyzed data to determine the impact of intervention thus far |
| 5-6 Phases III | • Reinforced strategy and added an additional resource to support student mastery of the intervention strategy  
• Participants continued to reflect in the Google Form at the end of each lesson and used their individual strategy card, as needed |
| 7-8 Phases IV | • None. Post-intervention phase. |

Participants worked to apply the intervention strategy at the end of each class. After they had utilized the strategy for 2 weeks, I coded their Google Form responses (which automatically populated in a Google Sheet) by topic and looked for patterns in their responses. I did not want them to rely on asking me for help verbally every time and come to depend on me as an external influence for the reframing of their thoughts. Since this initial coding showed that students needed more support in the autonomous regulation of their emotions related to their mathematical self-beliefs, I developed a strategy card for each student based on the themes in their individual responses about the
negative thoughts they frequently experienced (see Figure 3.1). The rationale behind the development and addition of this resource was for the study to evolve with participant needs by providing a resource appropriately designed for participants’ readiness levels. The addition of this resource is also justified by the recursive nature of action research. The purpose of action research is to continually evaluate the intervention being implemented and make adjustments according to the needs that arise from the data (Efron & Ravid, 2013; Ma et al., 2018).

![Image](image.png)

**Figure 3.1 Example of Individual Strategy Card**

In Phase III, students continued to use the Google Form at the end of each class to reflect and practice the lemonade strategy. If needed, they used their personal strategy cards to choose a phrase for reframing. Participants were given two copies of this card—one that I kept in my classroom and another that they could take with them to use in their general education classrooms or wherever they felt they needed it. Students continued to reflect and fill out the form for 2 more weeks. The end of those 2 weeks marked the end
of the intervention period. Before starting Phase IV, I coded the reflection form data from Phase III by topic and compared it to the patterns from Phase II.

Phase IV, the final phase of the study, was to conduct the post-intervention semi-structured interviews. I asked the same questions as in the pre-intervention interviews with the addition of three questions that specifically concerned experience with and opinions on the effectiveness of the lemonade reframing strategy. The additional three questions can be found in Appendix B. This phase served as a way for students to ascertain and validate or invalidate the effectiveness of the intervention strategy. This positioned their voices as central to the validity of the study.

**Data Collection Methods**

Sources of data included pre-intervention semi-structured interviews, student reflections, post-intervention semi-structured interviews, and field notes. These choices align with the tenets of humanistic learning theory, cognitive learning theory, and cognitive behavioral therapy for centering participant perspective and knowledge and empowering student voice and ownership over processes that mediate their learning. This is especially true for the semi-structured interviews, which helped in accessing participants’ understandings of the world and perceptions of the problem that this study sought to mitigate. Likewise, the post-intervention semi-structured interviews granted fuller ownership over validating or invalidating the effectiveness of the study, knowledge construction, and next steps. Each choice of data collection instrument aligned with the research questions of this study.

Table 3.3 shows the alignment between the research questions and related data collection decisions. Following the table is a comprehensive justification for each.
Table 3.3 Alignment of Data Collection Methods with Research Questions

<table>
<thead>
<tr>
<th>Data Collection Method(s)</th>
<th>Description and Frequency</th>
<th>Research Question Alignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semi-structured interviews</td>
<td>To be completed before and after the seven-week intervention period to understand participants’ perceptions of their mathematical self-belief.</td>
<td>RQ #1, #2, #3</td>
</tr>
<tr>
<td>Student reflections</td>
<td>To be completed by students after each lesson.</td>
<td>RQ #3</td>
</tr>
<tr>
<td>Field notes</td>
<td>Notes jotted by researcher when something noticeable stood out.</td>
<td>RQ #1, #2, #3</td>
</tr>
</tbody>
</table>

**Student Reflections**

Student reflections gathered by their exit tickets completed in the last 5 minutes of each class session served as the means for the collection of continuous formative data, particularly concerning participant perceptions of their own experiences and growth. They used this reflection space to practice reframing their mathematics self-beliefs. The reflection form remained the same for each check-in. These exit tickets were adapted from a resource by a licensed family therapist and former school counselor (Ross, 2023). I have also used them in my classroom in the past but with a different demographic in a different instructional setting. Therefore, they have been tested and tweaked as they were incorporated into instruction in the past.

**Semi-structured Interviews**

Semi-structured interviews were conducted with each participant individually both before and after the intervention. These interviews included questions to gather participants’ perspectives on how emotions mediate learning, strategies for coping with uncomfortable emotions, perceptions of the purpose of academic achievement, beliefs about the teacher’s role in their learning and behavior, and beliefs about their own role in their learning and behaviors (see Appendix B). Both sets of interviews were compared to
look for changes in participant responses to generate claims to determine the impact of the intervention in bringing about those potential changes in emotional competencies, including self-regulation. These interviews were used to inductively analyze themes across all three research questions. I developed the questions and asked my supervisor to review them for clarity, developmental appropriateness, and alignment with the research questions.

In the pre- and post-intervention semi-structured interviews, students were asked to describe how they felt about their academic abilities overall and specifically their math abilities in comparison to other subjects. In the post-intervention interviews, they were asked how they felt about their academic abilities and then, as a follow-up to their responses, whether their self-beliefs had changed because of the cognitive reframing strategy they had learned and practiced. They were also asked to give examples to further explain their responses. Specifically in the post-intervention interviews, they were asked whether cognitive reframing helped them to be more successful in math and how they may have applied the strategies used in settings outside of the mathematics classroom. They were asked to give examples. Their responses from both the pre- and post-intervention interviews were analyzed for any changes.

Field Notes

Throughout the study, I took notes about my own observations as necessary. These notes were about participant behaviors, their ease or difficulty in independently using the intervention strategy, and their attitudes about the math skills they were learning that day. I used participant interview data and continuous monitoring of participant reflection data and noted anything that was in-line with or contradictory to
their reports. I did not take these notes every day. Therefore, these data were not used to determine patterns; rather, they were used as to supplement discussions of the main sources of data: interviews and student reflections.

**Data Analysis**

After initial interviews, the data were transcribed and coded by topic. As the intervention took place, data from student reflections (responses in the Google Form) were coded by topic as well. This coding informed adjustments that needed to be made, such as the additional supports in the Google Form. After the intervention, all coded data were sorted based on emerging themes (Efron & Ravid, 2013). A portion of the time spent during post-intervention semi-structured interviews entailed students validating (or invalidating) the claims that I had generated from the other data sources throughout the research process. Efron and Ravid (2013) described this as validating interpretations by searching out alternate interpretations. This is a powerful way to not only ensure internal validity but also to focus on empowering student voice over learning outcomes in the classroom as well as the construction of knowledge in this study.

This study purposefully used different data collection methods to account for multiple factors and perspectives that may affect the outcomes of the intervention being studied. Using multiple data collection methods ensures internal validity for the study (Efron & Ravid, 2013; Merriam & Tisdell, 2016). Additionally, attention was given to any potential confounding factors to address any outliers or inconsistencies. Reliability was backed by internal validity (multiple data collection methods) and external validity (participant validation of outcomes via the post-intervention semi-structured interviews).
Summary

This study was a qualitative action research design that sought to investigate the impact of cognitive reframing on third and fourth grade math intervention students’ mathematical competence and self-concepts. Narrative inquiry is the qualitative data analysis method that informed the research design, development of the data collection instruments, and the data that those instruments produced. An explanation of the intervention, example of the strategy that participants will be provided, and explanation of how data will be thematically coded was discussed in this chapter. Chapter 4 reports the findings of the study, and Chapter 5 discusses the implications of those findings.
CHAPTER 4

RESULTS, FINDINGS, AND INTERPRETATIONS

The problem of practice that prompted this study is that students’ negative self-beliefs about their mathematical competency was causing anxious behaviors such as work avoidance, frustration, and general difficulty coping with the stress caused by mathematical tasks. Consequently, this qualitative action research study investigated the impact of cognitive reframing on the perceptions of 14 third and fourth grade math intervention students regarding their mathematical self-beliefs and their ability to autonomously regulate those perceptions.

Humanistic learning theory, cognitive learning theory, and cognitive behavior theory comprised the theoretical framework that informed the 8-week intervention. During the intervention, participants were taught the cognitive behavioral therapy skill of cognitive reframing, whereby they practiced identifying negative or irrational thoughts related to their mathematics learning, named the emotions associated with those thoughts, and reframed them in a positive or rational way. The following research questions guided the study:

1. What are students’ self-beliefs about their mathematical competence?
2. How do students’ self-beliefs about their mathematical competence affect their agency and autonomy over their learning?
3. How does the integration of cognitive reframing in math instruction impact third and fourth grade students’ perceptions of their own mathematical achievements and competence?

The intervention took place with third and fourth grade math intervention students in a racially, linguistically, and socioeconomically diverse New Jersey suburb. First, pre-intervention semi-structured interviews were conducted to understand participants’ perceptions of their mathematical self-beliefs. Then, interview data were coded by topic and emerging themes were determined to ascertain whether the intervention strategy of cognitive restructuring would be appropriate. After that, the researcher modeled for them how to use the Google Form to identify and then reframe negative or irrational thoughts. Participants then practiced this strategy by using the form after each class period. This encompassed Phases II and III, wherein participants practiced this strategy for 4 weeks. After that, post-intervention semi-structured interviews were conducted, giving participants the opportunity to validate the effectiveness of the intervention and provide insight into future considerations. This concluded Phase IV, the final phase of the study.

This chapter presents and discusses the results of the intervention as well as interpretations of the data and themes. This includes the connection of the research questions to emerging themes that were generated by coding each set of data by topic. Narrative inquiry was utilized to focus on generating themes that emerged through participants’ perspectives to ensure the meaning that was generated from the data was derived from participants’ voices remaining at the center of the study.
Data Presentation

I gathered data using pre-intervention semi-structured interviews, student reflections, post-intervention semi-structured interviews, and field notes. These methods were chosen so that student voices could be centered throughout the study. The data are presented according to the phases in which the study was conducted. To determine themes that emerged from the data, I compared each transcribed interview to previous transcriptions. I highlighted similar sections of each interview with the same color. When a new theme started to emerge based on similarities, I named a new code and represented by a new color. After completing all interviews, the colors that emerged most often helped determine the main themes of the data set. Responses that fell outside of the main codes that emerged were also noted and are discussed later in this chapter. Justification and presentation of the results from each method are discussed in the following sections. I coded my field notes in the same way and that data will be woven throughout the discussion because they are interrelated with the other sources of data.

Phase I: Pre-Intervention Semi-Structured Interviews

The appropriateness of the cognitive reframing intervention had to be determined prior to implementing the intervention. Consequently, I conducted semi-structured interviews with all 14 participants during the first 2 weeks of the study. Questions included how do you feel about math, how do you feel about learning, how do you feel when you don’t know something in math, what do you do when you don’t know something in math, and believing in ourselves helps us to learn better—do you agree, why or why not? (see Appendix B). I read each question aloud and audio-recorded participants’ responses. I then transcribed the audio to allow for qualitative analysis wherein I coded
each transcript by topic. The following discussion shows the results of the interview and data analysis process.

Participants’ responses informed the categories for this data. Four participants reported math mostly giving them mixed feelings based on success with a task. For example, Nina said, “Math makes me feel happy because I like math. Not if I don’t understand something, then I’m not happy.” Similarly, Marco said, “Math makes me excited ‘cause, like, I like learning new things.” When asked how he feels when he does not understand something in math he said, “Like..um, kind of stressed out to not know the answer.” Likewise, Evan explained, “When I don’t understand it’s confusing but if, if I do like, understand then it’s fun.” Inez showed some self-awareness when she said, “Math is a little stressful, but now that I’ve been practicing more it’s easier.” She is the only participant who reported awareness of a strategy to manage stress and frustration.

In contrast, 10 participants reported math always causing feelings of anxiety. For instance, Alisa stated, “Math makes me feel stress and mad. And a stomachache, and like I want to run out the door.” Samantha similarly explained, “Math makes me feel overwhelmed. Like a lot of the time I get distracted then I look back and everything is on the board already and then I just feel nauseous.” Isla said that her brain “just flops down [when] more complicated stuff gets added.” Evan disclosed, “Math makes me feel confused and uncomfortable.” James stated, “Math makes me feel frustrated because I don’t know all my facts.” Feeling and self-belief depending on knowing the answer emerged as a theme in the data and is discussed further in later sections.

Most participants reported low levels of self-efficacy and self-belief, which lead to high math anxiety. When asked what she does when she does not know something in
math, Isla said, “I just calm myself down and like say, I’m gonna figure this out no matter what.” When asked if she asks for help if she still does not understand after trying by herself, she said, “I never ask for help. I just cover my paper and wait for the teacher to go over it.” This question was asked to understand participants’ existing strategies for managing their emotional responses when faced with an undesirable feeling related to a mathematics task. Like Isla, most participants reported being uncomfortable asking for help. For example, Alisa said that she tries by herself first and then asks for help from a friend because they will usually “just give her the answer.” Samantha said that she will pretend that she is working until the teacher goes over it, but when she asks for help, she asks a friend instead of the teacher because she is “not comfortable asking the teacher ‘cause I might think they won’t give me the answer. Except for you—you always help me.” Table 4.1 shows additional participant responses supporting this result.

<table>
<thead>
<tr>
<th>Interview Question</th>
<th>Participant Response</th>
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| What do you do when you don’t know something in math?                              | • “I never ask for help. I just keep trying. I don’t like asking for help . . . Because the teacher makes me uncomfortable. Not you. My other teacher. I always ask you.”  
• “When I don’t know, um, I, well like I just leave it and put a random answer.”  
• “I just try to figure it out by myself. I’m nervous to ask the teacher cause they’re busy. I don’t want to be like rude, like interrupt ‘cause they might yell at me.”  
• “If the problem’s like really, really hard and I’m the only one who hasn’t got it, then yeah, I get upset. But I’m trying to figure out what I did wrong.” |

Lastly, in regard to self-belief, some participants thought that believing in themselves helped, whereas others thought that sometimes it does and sometimes it does
not. For example, when asked whether she agreed with the statement *believing in ourselves helps us to learn better*, Alisa said that “maybe” believing in herself helps her to learn better: “I, um, because sometimes you think that, you might think that oh, this is easy but, well, when you realize, when you get to see what it actually is you are gonna be so confused that you’re not gonna think the same thing that you were thinking before.”

Other participants linked the concept of self-belief to getting a problem right or wrong. Marco said, “You won’t get the answer correct if you don’t believe in yourself,” and James gave an example of this same belief stating, “Yes because this one time in second grade I believed in myself and got the problem correct.” Inez’s response echoed this sentiment when she explained sometimes believing in yourself helps “because, like, I could believe I could do it, but I could still put it wrong.” Maria said she did not know if she agreed with the idea that believing in ourselves helps us to learn better but said, “If the teacher says ‘good job,’ then I believe in myself, but, like, you know if they don’t say ‘good job’ or like, make a face like I didn’t get it, then I don’t really believe in myself anymore.”

Isla and Anna both said that they agreed with the above statement but were unsure how to explain their reasoning. Evan was the only outlier who believed that believing in himself helped him to learn better and his response did not link the concept of self-belief to right and wrong, or an external motivator. He explained, “Yes. When I believe in myself, I’m more comfortable with math.” Evan’s conceptualization of the concept of self-belief was linked to an intrinsic feeling, whereas the rest of the participants’ conceptualizations—except for Isla and Anna, who were unable to explain—hinged upon the ease or difficulty of the task or getting the correct answer.
Table 4.2 shows the initial codes that emerged from the pre-intervention semi-structured interviews as they align with the first two research questions for this study.

Table 4.2 Alignment of Pre-Intervention Findings to Research Questions

<table>
<thead>
<tr>
<th>Research Question</th>
<th>Initial Codes</th>
</tr>
</thead>
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| RQ #1: What are students’ self-beliefs about their mathematical competence?      | • Right and wrong  
• Gives up  
• Frustrating  
• I can’t or I’m dumb  
• Stress or anxious  
• It sometimes helps to believe in yourself  
• Believing in yourself doesn’t always work  
• Avoids asking for help with math  
• Believing could help you get the right answer |
| RQ #2: How do students’ self-beliefs about their mathematical competence affect their agency and autonomy over their learning? | • Can’t do it without help  
• Can’t do a problem if it’s hard  
• Won’t try by themselves first  
• Getting the right answer helps you believe in yourself more  
• Believing in yourself doesn’t always help |

To determine initial codes, I highlighted words or ideas that frequently occurred to find recurring patterns and sorted them into categories. I then used those topics to determine that the original intervention plan would be an appropriate choice to investigate the impact of supporting students’ autonomous regulation of their self-beliefs.

**Phase II: Student Reflections Weeks 3-4**

During the intervention, participants filled out reflection forms at the end of each of the 12 math lessons. The form asked them to identify any negative or irrational thoughts related to learning during our 20-minute small group math intervention period that day. During this phase, 41 of 47 participant responses in the reflection forms showed
that participants experienced negative thoughts about their mathematical self-beliefs on a given day. The most frequently occurring words (followed by the number of iterations) were hard (5), stress (4), frustrated (4), and mad (3). Specific participant responses included I was stressed, this is hard and I can’t do it, I feel stressed from the word problems, I’m just bad at math, I was frustrated, and I’m mad at myself. These responses align with my field notes as well, with the most frequently occurring observations being avoidant (5), frustrated (6), and seems burnt out/tired (4).

Participants then used the lemonade strategy to reframe their thoughts, writing phrases such as it’s okay to not know something, it’s okay to ask for help, I am smart and can try new things, this might be hard but I can practice, and I can do hard things. By the end of the second week of this phase, 10 participants wrote that they had no negative thoughts, in contrast to four during Phase I. A key takeaway is that if participants’ automatic emotional responses to mathematics tasks are negative, it may take consistent effort and intentionality to challenge and change their perceptions of their mathematical self-beliefs. This was consistent with my field notes, which showed 12 participants needing prompting from me at least twice over the first two intervention weeks to recognize, reflect on, and change their maladaptive thoughts.

During Phase I, participants needed a considerable amount of support when trying to turn their negative thoughts into something positive or more rational. My field notes showed that 12 out of 14 participants needed help two times or more. For these participants, I gave them suggestions about what they could say to themselves that they typed into their reflection forms. At first, I thought that they might need time to get used
to using the strategy, but toward the end of week 2, field notes showed that 10 participants were still asking for support.

To address this, I examined each participant’s responses and noticed a pattern. Each participant was struggling with very similar negative self-talk during each class session. For example, Andre wrote, “I am bad at this.” The following session, his negative thought was “I am bad at this, and I am mad myself.” The next day, he wrote, “I am dumb, and I am mad at myself.” To counter this, he wrote, “It’s okay to not know something. I am always learning new things.” I suggested this alternative thought was suggested based on my field notes, which highlighted observations that he was consistently dependent on me to help him reframe his thoughts. Isla’s responses showed a pattern as well. For her first reflection, she wrote, “Too hard,” and in her second reflection, “I felt overwhelmed. Like I will never understand.” Likewise, she said, “It’s too hard. I can never do it;” however, she later reframed it: “This might be hard, but I can practice and grow my brain.”

Only one participant did not show a pattern of negative thoughts. In Marco’s first reflection, he wrote, “New strategies are confusing,” but he reframed it as, “I’m smart and can try new things.” For the rest of his reflections during the phase, he wrote, “none” in the negative thoughts category and for the reframing category wrote, “Trying new things makes me feel proud,” “learning new things makes me feel confident,” and “new strategies are good!” He was the only participant whose reflections during this phase showed a positive pattern. This is consistent with my field notes in which, three times over those 2 weeks, my documentation stated that “he’s not avoiding! Using place value to add [more complex strategy] instead of counting on.”
Considering that one of the aims of this intervention was to empower students and support their autonomy over their emotional regulation of their learning, the initial data analysis of participant reflection forms during Phase II suggested that it was important to provide a scaffold that did not require in-the-moment dependence on the teacher as the external force so that participants could begin to conceptualize self-belief as dependent on how they view themselves and independent from the influence of others.

Recognizing that this sticking point for many of them could have been because they did not yet have the emotional vocabulary to reframe on their own, I created personal strategy cards for each participant after observing patterns in each participant’s negative thoughts. Cards consisted of positive phrases that they used in their reflections, as well as new positive phrases for each of them based on the negative thoughts they had reported (see figure 4.1). Removing myself as a scaffold was intended to be a small step in moving them toward more autonomy in regulating their negative or irrational thoughts related to their mathematical self-beliefs. This was especially important given that data from the pre-intervention interviews showed that participants’ self-beliefs and self-efficacy in regulating and maintaining beliefs were dependent on external forces. This was apparent in the initial codes showing that participants’ self-beliefs were dependent on getting an answer right or wrong, that they did not think they could do something if they perceived the task to be too difficult, and that they defaulted to thinking that they could not achieve success by trying on their own first and that they always needed someone there to help them.
Phase III: Student Reflections Weeks 5-6

During the last 2 weeks of the intervention, participants used their personal strategy cards to help them autonomously apply the cognitive reframing strategy. They continued to reflect at the end of each lesson by identifying and recording any negative or irrational thoughts and recording the reframing of those thoughts. During these 2 weeks, all but two participants recorded at least once that they had no negative or irrational thoughts, and six participants recorded no negative thoughts at least two or more times. This was a stark change from their responses in the previous 2 weeks, when only one participant had recorded no negative thoughts one time and another participant three times.

The most frequently occurring phrases (followed by the number of iterations) entered into the negative thought category on the reflection form were nothing (10), I’m smart (4), this is hard (4), and I want to quit (4). Other positive phrases entered that did not reoccur were I didn’t feel discouraged, I felt good, and I’m excited about what we’re doing. The words and phrases that occurred most frequently in my field notes were smiling (7), not avoiding (8), and trying again without getting frustrated (5).

Even when participants did not record any negative or irrational thoughts, they still recorded positive phrases in the Change your negative thoughts to something more realistic and positive! and Think: What can I learn from this situation? reflection categories. Their most frequently occurring reframed phrases (followed by the number of iterations) were I am smart (9), I can do hard things (7), and I can trust my brain (4). Other positive phrases entered a single time were it’s okay to ask for help, this makes me
feel proud of myself, I'm smart and nothing can stop me, it's okay to take a break and try again, it is okay for things to not be perfect, and I feel happy when I’m nice to myself.

**Phase IV: Post-Intervention Semi-Structured Interviews**

To further understand the impact of the intervention and, most importantly, to allow participants to validate the effectiveness of the intervention, I conducted post-intervention semi-structured individual interviews. During these interviews, I asked them the same questions as the pre-intervention interviews with the addition of three questions that were specific to the effectiveness of the intervention (see Appendix B).

At the end of the intervention, participants’ feelings about math remained generally mixed, as they had in the pre-intervention interviews. One participant reported totally positive feelings about math (a change from his previously reported feelings). Of the remaining participants, six reported mostly positive feelings, one reported somewhat positive feelings, and six reported only negative feelings.

Maria reported mostly positive feelings, saying that math makes her feel “good and calm,” and Isla said, “It’s getting a little better.” In contrast, in their original interviews, both participants had indicated that math is stressful. In the initial interview, Evan described math as something that made him feel confused, uncomfortable, and “not smart.” After the intervention, he felt fully positive feelings, stating that math makes him feel competitive because “it’s like a challenge and that makes me confident.” He also noted that when he does not understand something, it does not bother him; rather, he tries again. Samantha explained post-intervention that math makes her feel successful because “even if I don’t know, I learn and it helps me,” whereas pre-intervention she had said that math made her feel stressed and nauseous.
Regarding self-belief, in the final interview, nine participants definitively indicated that believing in themselves helps them to learn better; however, the reasoning of three participants continued to show persistently that they saw self-belief as tied to right and wrong or another external factor. James explained, “The last time we came here, we did plus and minus, and I said in my head, I can do this, and then I got it correct.” Maria gave an example saying, “Yeah, because I won’t just give up. On my math test I didn’t know this one, but then sometime I just guess and sometime I get it wrong and sometime I get it correct; and [when I] got my test back and was like ‘Oh I did it!’” Adam similarly stated, “Yes, when I believe I keep thinking . . . then I usually get it right.”

Conversely, some participants did not mention anything about getting a correct answer when they talked about self-belief after the intervention. Samantha was previously fixated on whether an answer was right or wrong and how that impacted her perception of her competence, but post-intervention she said, “Yes, believing in yourself helps. If you believe in yourself, then you can get through it.” Isla was now able to articulate her thoughts, stating, “Yes, kind of . . . because sometimes when you believe in yourself you can get better and it’s okay if it doesn’t work out for you.”

Concerning the cognitive reframing intervention strategy (lemonade), many participants’ responses showed that reframing thoughts was helpful, and if others learned how to reframe their thoughts it could help them, too. Conversely, some participant responses contradicted this. Ten participants reported that the intervention strategy helped them to believe in their mathematical competence more, whereas two reported it was helpful to them but potentially could be helpful for others; one reported it “sort of
helping” but not seeing how it could help others. Anna thought, “It sort of helped me. It would have been better if I could write it on paper, not in the computer.” Alisa said, “It didn’t help me. I just hate math. But it might help other kids because like, maybe other kids don’t think like I do, you know? Like, everyone thinks different and has a different, what you call it, what’s that word? Perspective!”

Overall, the 10 participants who reported the lemonade strategy as helpful discussed specific phrases they remembered or things they learned about themselves. For example, Samantha reported, “Okay, so, when I was in math in my other class, I was looking at it [the problem] and then I just looking and looking and looking at the math. I was so stressed but, but then I thought ‘lemonade!’ And said, ‘I am smart and can trust my brain’ and like, like a, what is it, a lightbulb! A lightbulb came on and I felt confident, and I did it!” This is markedly different from her response in her pre-intervention interview about math making her nauseous, giving up, and not wanting to come to school. Similarly, Adam recalled, “One time in my other class I was having trouble and then I, then I remembered lemonade. I remembered I am smart and I am always learning new things.” These participants’ experiences suggest that over time and with practice, students can start to recall positive thoughts about their competence when faced with a math situation that is uncomfortable or stressful for them.

Isla reflected, “Lemonade helped me a little bit. Mostly because the examples helped me believe that it was like okay to do those things [take a break, ask for help, make mistakes].” When asked if she thought it could help others, she continued, “Yeah. Because sometimes maybe other students feel too like there’s always a perfectness in their brain that they can’t get out.” Maria noted, “Lemonade helped me calm myself.”
Marco said, “It helped me be confident using a new strategy instead of not trying.”

Similarly, Samantha reported, “Lemonade helped me. I think it can help other kids so that they can get better, maybe then they don’t get stressed and they try their best and the more they do it, like, the less stressed they’ll be.”

**Findings**

After the first 2 weeks of the intervention, most participants continued to show dependence on me to help them reframe their thoughts. Consistently reflected across both interview phases and the participant reflections were the perceptions that self-belief is dependent on getting something right or wrong and math is something that is stressful. Self-belief as an emotional competency that is dependent on getting something right or wrong was an idea that five participants mentioned during pre-intervention interviews and seven mentioned during post-intervention interviews. These participants connected the degree to which they believe in themselves to how often or whether they could arrive at the correct answer or how good they were at something. Three participants also explained situations in which self-belief had to do with someone else, like a teacher, telling them whether they did well. This conceptualization of self-belief as externally dependent or dependent on right and wrong could be explained by the systemic expectations of control in school.

The outcomes of the first two intervention weeks prompted me to create personal strategy cards for each participant. With the addition of this individual strategy card resource, participants showed more positive emotional responses to mathematical tasks during class and decreased teacher dependence in their ability to reframe their thoughts over the next 2 weeks of the intervention. Once they had their strategy cards, help or
prompts from me ceased. Instead, they simply took out their cards and independently chose a phrase they needed to use as their reframed thought for that session. The effectiveness of this was shown clearly in the number of reports of no negative thoughts in their reflections during the last 2 weeks in comparison to the first 2 weeks. In the first 2 weeks, 43 of 47 responses were reports of negative feelings. In the last 2 weeks, 21 of 40 were negative. This shows growth in their automatic emotional responses to mathematical tasks.

In the final interviews, participants were able to identify that it is helpful to have a strategy when encountering a mathematical stressor. Pre-intervention, 11 participants reported in their interviews that their strategy for those situations was to immediately experience stress, try but then give up, or ask a friend or teacher to give them the answer. Most participants noted that when they are stressed and do not know what to do, they will not try on their own because they are afraid to get the wrong answer, but they will instead ask a friend or the teacher in hopes that they will provide the answer. Other participants said they would ask the teacher or wait until the teacher goes over a problem in class.

In post-intervention interviews, only one participant reported not trying on his own first, continuing to default to asking a teacher. Other participants said that now they try on their own first. When asked if it was the lemonade strategy that helped them do this, no participants were able to definitively confirm this, but they noted that lemonade generally helped them to summon a positive self-belief to persevere in stressful mathematical situations. This could be a result of their ages and not yet having the full emotional awareness to understand what is influencing the changes in their behaviors and
emotions. Nevertheless, participants were able to articulate a general noticeable change in their responses to stressful math stimuli.

**Data Analysis and Interpretation**

The data demonstrate key themes regarding the first two research questions. Concerning the first research question (*What are students’ self-beliefs about their mathematical competence?*), data from the pre-intervention survey showed that most participants felt stressed, nervous, or overwhelmed by math. Responses clearly showed that math was a source of stress and anxiety for the participants. Even participants who reported sometimes feeling happy or fine about math reported feeling stressed or frustrated when they did not understand something in math. This theme was unsurprising, as the study was prompted because of my observations of students displaying signs of defeat or anxiety by shutting down, giving up, or acting out when introduced to a new concept or strategy, as well as from hearing negative remarks about their math ability or overall intelligence. The second research question asked, *How do students’ self-beliefs about their mathematical competence affect their agency and autonomy over their learning?* Before the intervention, the data showed that participants conceptualized self-belief as something that is largely externally controlled; however, post-intervention data revealed that they talked more about how the intervention helped them to think differently and less about relying on someone else for reassurance.

Before the intervention, participants overwhelmingly reported that when faced with mathematical tasks they did not understand, they defaulted to shutting down, avoiding asking for help, or asking a friend or teacher to give them the answer. Even the few who reported that they tried on their own first said that if they still did not understand
then they would give up instead of asking for help. This showed that their agency (the capacity to act) and their autonomy (the capacity to act independent from external control) has been thwarted. Participants’ lack of agency was most evident in that many indicated they did not like asking for help, as exemplified by Isla’s explanation: “It will look like I’m not being the way I’m supposed to be.”

This response is similar in effect to the lack of autonomy indicated by many participants’ comments about getting the right or wrong answer when asked whether believing in themselves helps them to learn. Many participants responded that sometimes believing in themselves did not help because they could still get the answer wrong. This shows that their concept of self-belief is dependent on external factors. If they get the answer right, they believe in themselves, but if they get it wrong, then their self-beliefs are compromised. This could indicate that through their schooling, they have received implicit messages through instruction that have taught them that the only way they can be sure if they are able to do something is if they get the answer correct. It is unsurprising that they would be affected by this kind of social conditioning, as students are used to being externally controlled in school. They follow school rules that they did not devise, they must obey their teachers, teachers often tell them whether they got a problem correct, and they take tests that give them numeric scores that they may internalize as fixed levels of competence.

The participants in this study were identified by tests and teachers as in need of academic support. Consequently, someone or something else frequently influences their conceptualization of self. They largely have not been given opportunities to develop agency or autonomy over their learning or perceptions of their competence within
systemic, traditional expectations of school, so it is predictable that these participants do not possess the necessary strategies for operating with agency and autonomy. Lastly, it must be noted that the research question asked about the effect of self-belief on agency and autonomy; however, from the data, it is unclear whether self-belief thwarts agency and autonomy or low self-belief is the result of thwarted agency and autonomy.

Lastly, the third question asked, *How does integration of cognitive reframing in math instruction impact third and fourth grade students’ perceptions of their own mathematical achievements and competence?* This is the question related to the impact of the intervention on participants. Most participants articulated that the reframing strategy helped them recall specific, reframed thoughts and phrases that had helped. They also reported an increased comfort in asking for help and trying again, rather than shutting down or asking for an answer. They could not, however, tie the reframing strategy to the concept of self-belief.

Before the intervention, participants may have needed direct explanation that self-belief is believing that they are worthy enough to try, and that even when tries yield unsuccessful results, they are still competent and capable. Because participants largely understood self-belief as externally influenced and controlled, it can be logically concluded that although they began to internalize the phrases from their strategy cards and independently reframe their mathematical self-perceptions, it was unclear to them how it related to self-belief. Rather, the data showed the theme that they did not believe that self-belief is an intrinsic, autonomous process, and instead dependent on external factors such as getting an answer right or wrong or the teacher saying they did a good job. Conversely, participants may have developed more agency and autonomy in their
learning, as evidenced by more participants’ reports of trying again on their own after reframing their thoughts. This significant change from pre-intervention, when they reported shutting down and giving up, suggests that the reframing strategy was helpful for their autonomous emotional regulation but was potentially unrelated to building their self-beliefs because they did not have an appropriate conceptualization of self-belief. This could be because this study investigated student emotional response and how their perceptions potentially mediated their self-belief but did not systematically investigate the role of mastery opportunities as a mechanism that works with emotional regulation to develop self-efficacy. The implications of this will be discussed further in Chapter 5.

Table 4.3 shows a snapshot of the data that supports the emerging themes from the post-intervention interviews.

Table 4.3 Alignment of Post-Intervention Findings to Research Questions

<table>
<thead>
<tr>
<th>Research Question</th>
<th>Emerging Themes</th>
<th>Participant Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>RQ #1: What are students’ self-beliefs about their mathematical competence?</td>
<td>Anxious when I don’t know something.</td>
<td>“Nervous. It makes me feel more nervous.”</td>
</tr>
<tr>
<td></td>
<td>Nervous and stressed.</td>
<td>“Upset like times ten. Because it’s hard.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“It makes me struggle. I feel like I can’t do it.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“Sad. Because then I don’t know something and I get annoyed.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“Mad. It gets me frustrated cause some problems I can’t solve.”</td>
</tr>
<tr>
<td>RQ #2: How do students’ self-beliefs about their mathematical competence affect their agency and autonomy over their learning?</td>
<td>Self-belief is dependent on getting the correct answer.</td>
<td>“Yeah. [Believing in myself helps ] because when you believe in yourself you can do it.”</td>
</tr>
<tr>
<td></td>
<td>Self-belief sometimes helps.</td>
<td>“Kind of. Because sometimes when you believe in yourself you can get better and sometimes it doesn’t work out for you.”</td>
</tr>
</tbody>
</table>
**RQ #3: How does the integration of cognitive reframing in math instruction impact 3rd and 4th grade students’ perceptions of their own mathematical achievements and competence?**

<table>
<thead>
<tr>
<th>Perception</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reframing helps.</td>
<td>“Yes. Because when I believe I keep thinking then I usually get it right.”</td>
</tr>
<tr>
<td>Believing in yourself helps sometimes.</td>
<td>“Yes. Because you do learn more and you do get the right answer.”</td>
</tr>
<tr>
<td>Reframing could help others.</td>
<td>“Yes [reframing helps]. Because it makes me be like… proud of myself. Using lemonade helped me be confident using other strategies.”</td>
</tr>
<tr>
<td></td>
<td>“[Reframing helped me] not really believe in myself but it did help me not say bad things. I say ‘I’m confused’ less. Now I ask for more help.”</td>
</tr>
<tr>
<td></td>
<td>“Yeah [reframing could help others] cause I know a lot of kids need motivation and they do need help with their negative self talk.”</td>
</tr>
<tr>
<td></td>
<td>“Yes [reframing could help others] so that they can get better and not get stressed and try their best.”</td>
</tr>
<tr>
<td></td>
<td>“Yeah [reframing could help others]. Because if they keep reading [the positive self-talk phrase] they will believe in themselves and they can do it.”</td>
</tr>
</tbody>
</table>

**Summary**

Results revealed that, initially, the main themes in the data were that math is stressful, students’ self-belief is dependent on external factors, and a reframing strategy helps manage uncomfortable mathematical feelings but possibly not self-belief. For the question regarding students’ mathematical self-beliefs, this study showed that participants held negative views about their math abilities, and this often caused stress during mathematical tasks. Similarly, the answer to the second question indicated that negative beliefs were linked to difficulty autonomously regulating their emotions to persevere in learning and an overreliance on external factors. Data relative to the third question revealed that a cognitive reframing strategy helped participants to positively change their automatic responses to a math stressor and supported their agency and autonomy in
mathematical learning. What is unclear is the effect on self-belief, as participants still widely linked self-belief to external factors rather than discussing self-belief as something that is internally dependent. Chapter 5 discusses and interprets these findings and provides insight into study limitations and considerations for future study of this topic.
CHAPTER 5
DISCUSSION, IMPLICATIONS, AND RECOMMENDATIONS

The purpose of this study was to investigate the impact of cognitive reframing as a strategy to mitigate the instructional problem of students’ negative mathematical self-beliefs. The 6-week study, comprised of a 4-week intervention and bookended by pre- and post-intervention interviews, consisted of participants learning and utilizing the cognitive reframing strategy to reframe any negative distortions in their perception of their mathematical competence. The following research questions guided the study:

1. What are students’ self-beliefs about their mathematical competence?
2. How do students’ self-beliefs about their mathematical competence affect their agency and autonomy over their learning?
3. How does the integration of cognitive reframing in math instruction impact third and fourth grade students’ perceptions of their own mathematical achievements and competence?

By the conclusion of the study, participants were able to autonomously reframe negative or irrational thoughts that had distorted their mathematical self-beliefs, most participants reported an overall positive change in their ability to cope with a stressful mathematical stimuli, and most participants continued to conceptualize self-belief as externally dependent, rather than something that can be controlled and nurtured through internal efforts.
This chapter discusses the outcomes of the study as related to the literature as well as recommendations for practice and future research. It also includes a personal reflection on the action research process with particular attention to culturally sustaining practices.

**Results and Related Literature**

Participant reports of math as a stressor and a cognitive reframing strategy as helpful is consistent with the literature from Chapter 2. The literature shows that people report higher level of anxiety in mathematics than any other subject (Dowker et. al, 2016). Additionally, multiple studies found that cognitive behavioral therapy (CBT) strategies were effective in decreasing students’ self-reported stress levels and helping them to cope with uncomfortable emotions and negative thoughts related to mathematical as well as other classroom tasks (Asanjarani & Zarebahramabadi, 2021; Forman & Barakat, 2011; Hofmann et al., 2012; Šouláková et al., 2019; Stalland et al., 2014; Starrenburg et al., 2017; Stran et al., 2020). The reports from participants in this study were in line with these assertions.

Additionally, a premise of CBT is that participants can learn strategies to autonomously recognize and appropriately regulate maladaptive thought patterns to feel better and modify their beliefs and interpretations in the long-term across multiple contexts (J. S. Beck & Fleming, 2021). This was shown to be true for participants of this study. Not only did most participants report a change in their ability to persevere and modify their thoughts, but six participants also reported utilizing the strategy with success in contexts outside of the intervention classroom. By the end of the study, participants were able to identify and reframe maladaptive thought patterns and most reported feeling better about mathematical tasks, were more likely to persevere through tasks, and were
more likely to ask for help than before the intervention. Participants also became more autonomous in identifying and reframing their thoughts when provided with personal reference cards of reframed thought examples. This was likely effective in that it aided in their meaning-making processes by expanding the self-belief phrases available to them, thereby helping them to independently interpret the stimulus differently (J. S. Beck & Fleming, 2021; Leder, 2017).

Although students gained the ability to positively modify thought patterns and persevere through mathematical tasks, what was unclear in the results of this study was the effect on self-belief. By the end of the study, participants continued to conceptualize self-belief as something that is externally controlled, with many of them explaining that believing in themselves can help to get an answer correct but that they can sometimes believe in themselves and be wrong, meaning that believing in themselves might not help. This is also explained by the literature in two different ways. First, Wells (2017) asserted that there are two alarmingly problematic beliefs that humans have been socialized into: (a) there is someone in control and one must not challenge that person, and (b) there is always a “right” and “wrong” way to do something. These ideas of not challenging power to survive and binary right versus wrong thinking as a marker of success date back to the maintenance and control of enslaved workers on plantations (Casey et al., 2013) and the production of efficient factory workers during Industrialization (Schiro, 2013). These values continue to be mirrored in systemic expectations of schools, where students are expected to follow rules, be efficient workers, and be orderly and “good” and do not challenge authority (Casey et al., 2013; DeCarvalho, 1991). Therefore, it makes sense that students would tie their beliefs in their
abilities to external measures. It is also understandable that it would take more than a 4-week intervention and single psychosocial strategy for them to interrogate, unlearn, and eventually challenge the belief systems that they are expected to operate within every day.

This leads to another explanation for participants’ conceptualizations of self-belief and why the reframing strategy alone may not have impacted those conceptualizations. Bandura (1977) explained that perceptions of personal efficacy are imperative in building self-belief and it is opportunities to master tasks or skills that are a necessary component in building self-efficacy because a person may believe they can be successful but if they are doubtful of their ability to carry out a task then this doubt thwarts their belief. The suggestion is that this can be mediated with opportunities for mastery.

Also consistent with the literature is the finding that an intervention such as the one implemented in this study can be embedded seamlessly into routine practice and instruction by individual practitioners (Durlak et al., 2011; Stran et al., 2020). I was able to easily integrate this strategy into my daily instruction and students showed and reported more agency and autonomy in utilizing the strategy as the weeks elapsed. Interestingly, literature asserts that there must be school-wide support for SEL efforts to be fully effective (Mahoney et al., 2020); however, given the issues with implementation of schoolwide programs and that SEL is a set of competencies and not a program, it can be hypothesized that individual, emotionally competent practitioners who have positive relationships with their students and who embed SEL strategies into daily instruction and routines may have more of a sustainable positive impact than whole-school SEL.
programs. This may be especially true for whole-school SEL programs that are implemented in a fragmented way due to issues such as perceived time constraints, teachers’ personal lack of emotional competency, and inadequate training for teachers and other school staff (Brackett et al., 2012; Hoffman, 2009; Jones & Bouffard, 2012, Mahoney et al., 2020).

Conclusions

The instructionally embedded cognitive reframing strategy in this study proved effective in building participants’ agency in autonomously regulating and changing their negative, maladaptive thought processes related to their mathematical self-concepts. Despite participants’ reports of the effectiveness of the strategy, many still reported math causing them stress and frustration as their automatic response, but that they were better at coping with those uncomfortable feelings more quickly and effectively, thereby enabling them to try again, be willing to try new strategies, or ask for help instead of avoiding mathematical tasks, giving up, or shutting down. This conclusion relates to research questions 1 and 2, and shows that centering emotional regulation skills in instruction can empower students’ agency and autonomous control of their emotional processes to facilitate positive engagement with learning tasks.

A conclusion in relation to the third research question is that practitioners should focus on supporting students’ conceptualization of self-belief. By the end of the study, some participants related self-belief to an internally controlled process but most persisted in describing self-belief as something that is dependent on external factors such as adults telling them they are right, wrong, or doing a good job, or whether they get the answer to a problem correct. It seems that although the cognitive reframing strategy supported their
ability to more effectively regulate their emotions and help them develop more
certainty and willingness to engage in mathematical tasks, they did not internalize the
change in their attitudes as a result of self-belief that may have been built intrinsically
through the cognitive reframing process. It is likely that many participants needed
explicit instruction around the concept that self-belief is not dependent on or defined by
external influence. Another explanation for this is that the intervention could have
possibly affected students’ self-efficacy more than their self-beliefs. Students’ reports
that they were more likely to try again, try a new strategy, and employ a coping strategy
when frustrated rather than giving up suggest that the intervention may have strengthened
their self-efficacy even though their mathematical self-belief still manifested as a mostly
negative self-narrative.

Lastly, this intervention showed that it is possible to empower students with the
internal capacity to form positive social-emotional competencies, through embedding
strategies like cognitive reframing into instruction. This intervention used individual
reflection opportunities, but doing this through modeling and collective group activities
as well may be a way to move toward shared liberation that shifts the focus of SEL from
trauma-informed care to healing-centered praxis (Lin et al., 2023; Simmons, 2021). By
doing this, teachers provide students with the social context and tools to intrinsically
shape their self-beliefs in a way that honors their identities and disrupts the social forces
that contribute to maladaptive thoughts that negatively shape self-concept. This could
help them to form a definition of self-belief that is not conceptualized by a narrow,
external view of worthiness that is dependent on right and wrong, following the rules, or
societal beliefs imposed on students that reify White western hegemony and ideals of
individualism and competition (Picower, 2009). To do this, teachers must see students as part of their own humanity so that they can begin to unlearn deficit narratives of People of Color and redefine what it means to see every child as capable (Muhammad, 2023). It is in this work of learning how to honor the humanity of others that teachers unlearn SEL as behavioral intervention or savior and embrace it as a liberatory practice (Lin et al., 2023). This is why the theoretical framework in this study is a composite of theories that address people’s agency and full humanity, and directly rejects the behavioral control and compliance implicit in the principles of behaviorism.

**Practice Recommendations**

Two key practice recommendations emerged from the outcomes of this study. The first is for teachers to embed SEL strategies such as cognitive reframing and other cognitive behavioral therapy (CBT) strategies into daily academic instruction and classroom management. The second is for teacher-researchers, administrators, or instructional coaches to provide ongoing training for all school staff in implementing interventions.

First, given that SEL is a set of competencies and not a program, and that the instructionally embedded strategy in this study proved effective, it would be wise for teachers to focus efforts on integrating SEL strategies into instruction rather than teach SEL as stand-alone fragmented lessons from a program. Shifting the idea of effective SEL to strategies instead of programs removes the issue of “not enough time;” however, for these embedded strategies to be effective, the practitioners themselves must be emotionally, socially, and culturally competent (Brackett et al., 2012; Ferreira et al., 2020; Jones & Bouffard, 2012; Lin et al., 2023; Mahoney et al., 2020). Being able to embed emotional regulation strategies into instruction could hold implications for content
areas other than just mathematics. These strategies could be embedded into instruction in any content area to help students cope when faced with an academic stressor.

Second, teachers should be provided ongoing professional development on how to implement these interventions. Teachers should first be taught how to use a given skill for themselves, because an effective practitioner of social-emotional competencies must be able to model the emotional and behavioral skills they are teaching (Brackett, et al., 2012; Ferreira et al., 2020, Jones & Bouffard, 2012). Teachers must also be able to forge positive relationships with students, as positive teacher-student relationships are a protective factor regarding students’ mental health, academic outcomes, self-beliefs, and positive identity formation (Donahue-Keegan et al., 2019; Hamre & Pianta, 2001; Oberle, 2018). Muhammad (2023) asserted that for any positive relationship to form, teachers must start with self-examination so that they can understand their own trauma, cultural factors, and healing needs to act responsively and responsibly out of love for their students. This includes understanding their positionality to their students, which was considered for this study. After that, instructional coaches can model for teachers how to implement and sustain the intervention throughout instruction and provide them ongoing support as needed.

Each of these suggestions can be implemented in this study’s school setting and could be of interest to other practice settings as well. Researchers at those sites will have to craft the intervention with consideration to the specific demographics and levels of social-emotional competencies of their practitioners and students. Therefore, the intervention may look different depending on the context. In my school specifically, we have been working to understand and implement best practices for behavior and creating
a positive school culture. Expanding on and implementing the intervention investigated in this setting aligns with current school goals. Organizers of the intervention would need to model for teachers how to implement the intervention, including adding strategies that this particular study did not investigate, and provide ongoing support during opportunities such as grade-level meetings, professional learning community meetings, and instructional coaching.

**Implementation Plan**

To share the findings of this study, I have been given administrative approval to design a professional development (PD) course to guide other teachers through the process of embedding cognitive reframing and other emotional regulation skills into daily instruction and classroom management. After the PD session, I will provide ongoing coaching support for teachers to cultivate social-emotional strategies and cultural competence and then embed those strategies into their daily instruction and routines. Teachers may choose to meet individually or visit grade-level PLCs. They will also be offered opportunities to observe how I reflect on identity, culture, and social-emotional competence and embed the strategies in my instructional practice. One larger group session will be offered; then a coaching model will be used for two reasons. First, it is difficult to get people to sign up for one professional development session let alone a series. Second, coaching is a more effective model for PD in that it enables the coach to form more meaningful, trusting connections with teachers that result in teachers being more willing to not only do the work necessary to change but also sustain the work (Esmail et al., 2017; L. Martin et al., 2014).
Once teachers begin implementing the intervention in their own classrooms, I will gather their feedback and present the results to district administrators. I am hopeful that providing training to teachers to better support their students’ social-emotional competence can lead the district to develop a long-term strategic plan for more instructionally sustainable SEL practices. This new course of action could replace the whole-school SEL program that is used currently, which many teachers report skipping over due to perceived time constraints.

In addition to this work in my practice setting, I will also seek out opportunities to disseminate my findings more widely, such as by presenting results at SEL conferences, school leadership conferences, elementary instruction conferences, and other math-specific presentation opportunities. It will also be useful to submit articles about findings to different media outlets and academic journals. This goal of this research is to secure a position teaching in higher education to continue my work as both a researcher, scholar, and educator.

**Reflections**

When this study and intervention were designed, I hypothesized that the cognitive reframing strategy would have more of an effect on students’ self-beliefs than it did. Although students used the strategy to reframe their thoughts and developed more self-reported perseverance, mathematical resilience, and willingness to ask for help, they did not internalize this change as a change in their self-beliefs. This finding was surprising at first and was considered as preparations for a new school year began and I planned further use of the intervention in my instruction. A way to attempt to correct this is to be more explicit in talking about self-belief with students, asking them questions such as
why do you think believing in yourself is about right and wrong and is there another way we can think about self-belief to gently guide their understanding. Another way to address this is to be sure to provide students with opportunities for independent practice and mastery in each lesson. I only have 20 minutes for my intervention sessions and sometimes we become so engrossed in collaborative learning that I lose track of time and lose the opportunity to have students practice independently. In implementing this intervention in the future, I will be mindful of ensuring there is time for independent practice at the end of each lesson that meets students at their level to provide them the mastery opportunities necessary to supporting their self-beliefs.

Considering the literature, it was unsurprising that students were able to identify that the reframing strategy was helpful to them or that some of them used it in contexts outside of the classroom. An aim of the study was to help students to strengthen their internal supports for emotional control, perseverance, and empowerment so that they did not look to others in power for reassurance. According to their reports, they did this.

When designing the intervention and data collection instruments, I considered my relationship to power and my students’ relationships to power within the school setting and, thus, our relationships to each other; but racial foundations of the intervention strategy were overlooked. This is an especially important insight into the study design for my practice setting and others that may be similar. The racial breakdown of participants in this study was 11 Hispanic/Latino, one African American, one Asian, and one White. Additionally, all 11 Hispanic/Latino students are multilingual learners who are proficient in both Spanish and English. This demographic breakdown is consistent with the breakdown of the larger school population. Culturally sustaining practices in SEL
instruction are especially important when considering the link between identity, agency, and autonomy. This was not given enough consideration in the intervention design.

Cognitive behavioral therapy (CBT) aligns with White Western ideals of individualism whereas this study’s participants’ cultures are more collectivist. This should have been the central focus of the research design. In reflecting, I think I focused on the problem and a specific intervention to fix the problem, which may be an occupational hazard especially in my specific position of practice. As a math interventionist, it is my job to identify a specific skill deficit and employ a specific intervention to address that deficit. Oftentimes the intervention needed is different for each student even if they are working on the same skill, so it is easy to get stuck in the one mode of individual differentiation, which CBT strategies lend themselves to well.

Additionally, a factor in the success of the intervention was likely the relationships I have with the participants, although this was not specifically measured. It should not have been assumed, however, that since I have strong and affirming relationships with the participants that specific questions about race, language, and belonging could be bypassed for this study. Additionally, the concept of belonging was not measured; rather, only individual self-belief was measured, but given the research, identity and belonging was likely a mediating factor in participants’ conceptualization of self-belief and their emotional readiness to grapple with that self-belief during the study.

**Personal Reflections**

This research is valuable to me both personally and professionally. Personally, I have always admired and respected research as something that strengthens me intellectually. Being curious, grappling with complexity, and constant reflection are
characteristics that are important to me in experiencing my full intellectual capacity. Additionally, emotional regulation and mathematics was something that I struggled with as an elementary school student. I will never forget, on multiple occasions, sitting at the kitchen table getting upset to the point of tears as I tried to complete my fourth grade math homework. Despite my father’s best efforts to help me, I had resigned myself to the idea that I must “not be a math person.” I have since released that maladaptive thinking for myself but I still hear it said often by students and adults, alike. My interest in this research topic was born out of my own experience as a math student, and to be able to use that experience in my instruction to create better instructional outcomes for my students.

Professionally, this research is valuable in that it brings to the forefront the importance of supporting students’ emotional regulation skills when designing academic interventions. Participant reports of more willingness to ask for help, try again on their own, not give up, and feel calmer and in control of their emotions during math learning are important insights into the conditions that need to be in place for students to feel safe and competent in persevering in problem solving and grappling with mathematical tasks. This research also addresses a gap in previous research in that it investigates the effectiveness of an individual practitioner’s effort at SEL without whole-school support. This is an area of research that is lacking compared to the research on larger school-wide SEL efforts (Bridgeland et al., 2013).

Limitations and Suggestions

A limitation of this study could have been the short amount of time for which the intervention was practiced. Participants learned and practiced the intervention strategy
over the course of 4 weeks. Some were ready to move on, becoming silly when it was time to reflect in the Google Forms, and required redirection to the task. A suggestion would be to add another 2 to 3 weeks and perhaps include fewer reflections rather than asking students to reflect after every class period. Instead, they could reflect when they need to, or after the 4 weeks of individual practice, and the next 2 to 4 weeks could be collective practice. Also, with a longer period of implementation, students can learn more than one emotional regulation strategy. Some students in this study reported the strategy sometimes, but not always, helping. With more than one strategy from which to choose, students would have another opportunity to develop agency over doing what works for them independent of external influences by having access to a more robust arsenal of social-emotional skills and competencies.

Another limitation is that the study tried to measure the impact of the strategy on self-belief, but students’ conceptualization of self-belief as externally controlled may have limited their internalized connection of reframing their perception of their competence to self-belief. Conceptualization of self-belief as externally dependent could be a confounding factor in the effectiveness of the intervention strategy. A suggestion would be to work throughout the study to more explicitly discuss this with students to move students away from thinking that they can only believe in themselves or trust themselves when they get something right and that self-belief is not about whether a person gets something right or wrong, but it is about believing that they are capable of trying, and that if they fail, they are capable enough to think, adjust, try again or ask for help. Explicit discussion on where self-belief originates and how it is nurtured (comes from within, not dependent on others) should be embedded organically into instruction
and routines via teachable moments, individual rapport and relationship building, and morning meeting activities.

Additionally, the small sample size could have limited the outcomes of the study. Additional research should study the intervention in general education, inclusive, and self-contained classrooms to understand the effectiveness of the strategy across wider demographics. Comparing data across multiple classrooms and teachers would add valuable information to understanding the impact of this intervention.

**Recommendations for Future Research**

Future research should implement the intervention over a longer period. This is necessary so that the researcher has ample opportunities to investigate patterns in the data and tweak the intervention according to student needs. This will provide more meaningful results than a shorter intervention period. Two to 3 weeks could be added in which participants can engage with the process more collaboratively and work together to foster community and belonging as they learn how to build self-belief. Additionally, studies investigating this topic further should provide participants with more than one emotional regulation strategy to use. The intervention could start with one strategy and then add more according to participant need as patterns in the data emerge, or multiple strategies could be taught and reinforced from the beginning with support for participants as needed in regard to choosing the appropriate strategy. This gives students a more robust emotional strategy “bank” from which to choose and further supports their capacity to exercise autonomy in identifying what they need and applying it accordingly, rather than having someone else control the strategy they use.
If future studies will focus on participants’ perceptions of self-belief, pre-intervention interview questions should ask more questions about self-belief to ascertain students understanding of the concept. These could be important for the researcher to determine how much direct or embedded instruction will be needed for participants to develop their conceptualizations of self-belief as an internal manifestation rather than an externally controlled phenomenon. This addition is an important consideration in that it would remove participants’ potential misconceptions of self-belief as a confounding factor in the results, thus providing for greater internal validity. Additionally, future studies should focus on both self-efficacy and self-belief to further understand the relationship between the two and the impact of strategies like cognitive reframing on mathematical identity. A focus on opportunities for mastery should also be included as part of the intervention so that students have opportunities to connect successful attempts at specific mathematical skills to the belief that they can actually perform those skills successfully.

Lastly, schools should provide teachers with consistent, ongoing coaching so that they are supported in their development of emotionally competent instruction and feel able to sustain that development to create an instructional environment for students that honors their full humanity beyond academics. This will also help to investigate the impact of their intervention in more than one classroom within a school, thereby enabling better understanding the potential usefulness and effectiveness of the intervention in different instructional environments. In a similar regard, future research should investigate the type of messages students are receiving about mathematics through the
instruction they are experiencing as a potential factor in students’ mathematical self-belief.

**Summary**

This action research dissertation investigated the impact of cognitive reframing on third and fourth grade students’ self-beliefs of their mathematical competence. The results showed that cognitive reframing empowered participants to autonomously regulate their emotional responses and thought processes resulting in greater perseverance, mathematical resilience, and positive feelings about their competence. Participants were not, however, able to conceptualize self-belief as something linked to their own internal thought processes and ability to regulate their emotions and modify those thoughts. The conclusions of this study enable professionals in the field to understand how students’ emotional processes affect their self-beliefs and, therefore, their academic readiness. From this study, educational professionals should be able to understand that a strong conceptualization of self supports academic health and readiness and sustained efforts should be made to support the development of autonomous emotional regulation in students so that the instructional environment can be one of empowerment and belonging.
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APPENDIX A

PARENT CONSENT LETTER

Dear families,

As some of you may know, I am currently studying curriculum and instruction as a doctoral student at the University of South Carolina. Over the next six weeks, I will be conducting an action research study to investigate the impact of a specific instructional strategy on students’ ability to maintain a positive belief about their mathematical competence. Throughout my time as an elementary school teacher, countless students have said to me that math is “too hard” for them or that they just “can’t do it” or that they’re “bad at math.” Oftentimes, this causes students to become anxious about math and/or avoid trying to learn math. When I was a student, I also struggled with negative beliefs about my own math ability, and I know from experience how difficult it is to change those beliefs and approach mathematics with confidence rather than anxiety. It is my goal through this study to find a strategy that helps students to reframe their thinking about math so that they can be more confident and successful mathematicians. I am inviting your child to participate in this study by providing feedback about their mathematics self-beliefs through interviews and reflections via Google Form after each lesson. This will take place entirely during school hours as part of my regular instructional time with students.

If you provide consent for your child to participate in my study, they will:

1) Participate in a 1-1, audio recorded interview with me so I can learn about their feelings about mathematics and themselves as math learners.

2) Be observed during my usual math lessons with them. This just means that I will jot down notes for myself about anything they say related to their beliefs about their math ability as I am teaching them.

3) Complete an exit slip at the end of each lesson to reflect on how they felt about themselves as a math learner that day and write about how they can stop any negative math self-beliefs and positively reframe those beliefs.

Student confidentiality will be maintained throughout the study. All data will be stored in a password-protected file in my Google Drive and only I will have access.

Student participation in this research is completely voluntary. If you consent to your child’s participation, your child can withdraw at any time. If you have any questions about this study or your child’s participation in the study, please reach out to me at kfrazee@nbschools.org.

Thank you,
Kelly Frazee

Student Name:____________________________________________

_____ Yes, I give consent for my child to participate.

_____ No, I do not wish for my child to participate.

______________________________________                             ___________________
Guardian Signature                         Date
APPENDIX X

SEMI-STRUCTURED INTERVIEW PROTOCOL

1. How does school make you feel?
2. How does learning make you feel?
3. How does math make you feel?
4. Do other subjects make you feel this way? (If yes, ask which subjects.)
5. How do you feel when you don’t understand something in math?
6. What do you do when you don’t understand something in math? (If clarification is needed: Do you keep trying? Do you give up? Do you get upset?)
7. Do you feel that you have everything you need to be successful in math? Explain.
   If no, what’s missing?
8. Believing in ourselves helps us to learn better. Do you think that’s true? Why?
   Can you give me an example?

Questions to add on to the above for post-intervention interview:

9. Did the strategy we learned help you believe in yourself more when it comes to math? How? Give an example.
10. Did you use the strategy in other subjects? Did it help? Give an example.
11. Do you think this would be helpful for other kids to learn? Why?
APPENDIX C

GOOGLE FORM WITH STRATEGY AND REFLECTION SPACE

LEMONADE
an Emotion Regulation Skill

WHAT IS LEMONADE?
An emotion regulation skill that helps you take a belief & turn it from a weakness into a strength

STEPS
1. Take an irrational or negative thought and change your wording - add more gentler, positive words
2. Ask yourself, "What can I learn from this situation?"

Example

1. Take an irrational or negative thought and change your wording - add more gentler, positive words
   
   change from
   I’m so bad at this. It’s going to be too hard!
   
   to
   I am feeling frustrated and worried, but I’ve done hard things before. I know I can get it if I take my time and practice.

2. Ask yourself, "What can I learn from this situation?"
   
   -- I can ask for help when I need it.
   -- I am always learning and evolving.
   -- I can take a breath and remind myself that I am the boss of my brain and I decide that I am going to write a positive story about myself and math!

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1. Take an irrational or negative thought and change your wording - add more gentler, positive words
   
   change from
   
   to
   

2. Ask yourself, "What can I learn from this situation?"