STEM SMART GOAL PLANNING FOR ELEMENTARY EDUCATORS IN RURAL NORTH TEXAS: A TRANSCENDENTAL PHENOMENOLOGICAL STUDY

By

Kate McCandless

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Education

Liberty University

2024

STEM SMART GOAL PLANNING FOR ELEMENTARY EDUCATORS IN RURAL NORTH TEXAS: A TRANSCENDENTAL PHENOMENOLOGICAL STUDY

By

Kate McCandless

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Education

Liberty University, Lynchburg, VA

2024

APPROVED BY:

Holly Eimer, EdD, Committee Chair

Shanna Baker, EdD, Committee Member

Abstract

The purpose of the transcendental phenomenological study was to describe the lived experience of educators setting pre-STEMs SMART goals and implementation at the elementary classroom level in rural North Texas districts. The pre-STEM areas are important to develop and intervene early, as they are foundational building blocks later to STEM education and professional opportunities for the rural population. The study's central research question was: What are the experiences of elementary educators in planning STEM SMART goals? The theory guiding the study is Locke's goal-setting theory (1968), based on his five tenets. The tenets of Locke's theory were used to guide educators through the goal-writing process in the areas of clarity, challenge, commitment, feedback, and complexity. The purpose of goal planning is to connect learning, planning, and progress working toward achievement. The 10 participants were a combination of third, fourth, and fifth-grade educators who were instructing in the areas of math, science, or both content. The educators participated in individual interviews, focus groups, and questionnaires, using written and audio-recorded transcripts by the researcher. Data collection was coded by themes, such as challenges, successes, content area, and shared experiences. The participants shared their educational concerns regarding time, support, and student readiness as contributing factors to student success or hindrance in the elementary pre-STEM areas. Consideration of these perspectives may be used to focus on the growth, incorporation, expansion, and dedication to the core math and science curriculum, subject matter, and future research.

*Keywords***:** STEMs, SMART, professional learning, rural education

Copyright Page

Dedication

None of the work would be possible without the love, forgiveness, and peace provided by God, Lord of all creation. He empowers the opportunities, lights my steps, and provides comfort in the hurricane on this earth.

Special thanks are given to my Mother and Father, who have demonstrated that education is a work of heart and can not simply be professed but must be lived out as an action. They instilled in me discipline so that I could accomplish hard things, and that passion makes the work worthwhile. My strong and dedicated husband allowed the time and made space in our lives for the title and dream. Encouraging friends kept me and my work afloat as late nights, early mornings, and seasons of education have changed.

The nonfiction work is my version of courage over comfort being acted out in written form. While not “fun, fast, or easy” (Brown, 2018), it speaks of the desire to make a difference in and within the people I walk among. Seeing educators and students who desire more from their education has inspired and continues to drive me forward. This work was a labor of love, passion, and forward determination to live out the values that others singularly profess.

Acknowledgments

I would like to express my deepest thanks to my Chair, Holly Eimer, and the committee for their guidance and review of this research. As teachers, they hold a special place and continue to inspire work of great caliber that is aligned with the Lord's purpose for each of us.

“Therefore go and make disciples of all nations, baptizing them in the name of the Father and of the Son and of the Holy Spirit, and teaching them to obey everything I have commanded you. And surely I am with you always, to the very end of the age”.(Matthew 28:19-20)

Table of Contents

List of Tables

List of Abbreviations

Science, Technology, Engineering and Mathematics (STEM)

Specific, Measurable, Attainable, Relevant, and Time-bound (SMART)

Emergent Bilinguals (EB)

English as a Second Language (ESL)

CHAPTER ONE: INTRODUCTION

Overview

The national average of unfilled Science, Technology, Engineering, and Mathematics (STEM) vacancies is higher than the number of candidates to fill them and continues to grow each year (Deville, 2023). The large number of unqualified candidates is unfortunate because those employed with STEM abilities earn 70% more than the national salary average due to these skills (Visually, 2023). A potential remedy to the shortage is providing STEM access for students to begin earlier in their education. Earlier integration could allow for more opportunities, access, and incorporation into the educational curriculum, starting with elementary educators (Sutherland, 2023). To explore the concern, my proposed qualitative research was to describe the lived experience of educators setting pre-STEMs SMART goals and implementing them in rural classrooms. SMART is the acronym for Specific, Measurable, Attainable, Relevant, and Time-Bound (Felder & Brent, 2024). The pre-STEM areas being considered within the study are science and mathematics, leading to development in technology and engineering at the secondary levels. Educators in rural settings may struggle to receive instruction and support and feel successful when underserved due to proximity and access (Texas Educational Agency, 2019). While STEM learning and support has continued to increase, specific focus on elementary-age students and rural school implementation has yet to catch up to more populated districts. In Chapter One, the researcher presents ideas on the social, theoretical, and historical factors possibly impacting the educators facing these dilemmas. Their stories and knowledge may help to shape the landscape for rural educators and students' STEM outlook with their shared expressions.

Background

Texas's commitment to public education runs deeply and has continued to evolve over the last 180 years (Texas Education Agency, 2022). However, rural districts nationwide are underserved and underrepresented, according to the Rural School and Community Trusts 2019 national report (Showalter et al., 2019). Educators in rural settings must be increasingly diligent to remain versed of the most current pedagogy and continue seeking opportunities to deepen their craft. Educators evolve through training (Showalter et al., 2019), providing high-quality instruction (City et al., 2018), and implementing research-based practices (Beale, 2020) so they can affect the next generation of students (Locke & Latham, 2019; Texas Education Agency, 2022). SMART goal planning offers a proven method for student-centered learning and directed growth through the educator's modeling, planning, and implementation (Weinstein, 2020). Regardless of whether these students are educators or Pre-Kindergarten students, having a research-based strategy is essential, as it affects the generations experiencing the product of the learning (City et al., 2018). Growing educators in current and important trends in education will be an ongoing mission in Texas, as the state continues to evolve educators' educational experiences (Texas Education Agency, 2022).

Historical Context

Public rural education has been a fixture in Texas since the early 1800s when Texas changed from church-based mission sites to part of the confederacy in 1836 (Texas Education Agency, 2022). In 1845, Texans established funding for rural schools across the state as part of their vision for citizens living on ranches or other rural agricultural cities. Education of youth was considered essential for precipitating the values and exposing students to necessary early education for successful integration into commerce. Texas set aside 1/10th of the annual budget to ensure funding for present and future school expenditures, beginning in 1820. The funding was available at no cost for the public education of Texas students and, later, the formation of school districts, as the student population continued to grow. Texas educators were primarily instructed in common schools in the 1800s and may have received additional religious training depending on the location. In present-day rural education across Texas, rural education can be very dependent on location, access to information, materials, and training for educators, according to the Rural School and Community Trusts 2019 report (Showalter et al., 2019). In an initial effort for educational exposure, the National Science Board (1986) task committee was published in 1986, followed by Senate Bill 7 in 1993 (Husted & Kenny, 2014) and *No Child Left Behind* (2001). The bills, legislation, and framework were an attempt to level the financial field and student access to equitable instruction (Chen & Huang, 2020; City et al., 2018; Texas Education Agency, 2022). Based on accountability, results for rural students still trail behind those of the more populated districts within the state (Chen & Huang, 2020; Showalter et al., 2019). The need for highly trained and qualified personnel in the areas of STEM will only continue to enhance as the state student population grows (Chen & Huang, 2020). When considering the allocation of time taught for evaluated subjects versus non-tested subjects, the focus continues to center on tested material (Long, 2023).

The Texas Education Agency (2022) estimated that Texas presently encompasses 1,039 independent school districts that educate approximately five million children. However, compared to the standardized experience educators received in the 1800s, Texas educators come to the classroom from various settings and backgrounds and have varied experiences (Nowikowski, 2017). As many as 50% of Texas educators in rural classrooms are considered alternative certified or second-career educators to fill the widening gap in educators' needs

(Texas Rural School Task Force, 2017). When educators leave college and enter the classroom, they are often left to fund their classrooms, seek resources, and be responsible for their own continuing education with only a limited support system (Rosenblatt et al., 2019). Other candidates leave other careers in technology, engineering, real estate, and hospitality to become potential educators. After a few introductory online or in-person courses, they enter the classroom to begin instructing students (Grossman et al., 2021). While there is monitoring through these alternative certification courses, they may require as little as sixteen course hours before they set foot in the classroom. The unequal experience can leave educators feeling like they do not have the correct tools to oversee educating and managing behavior and classroom structures while being held accountable to state testing standards (Grossman et al., 2021; Rosenblatt et al., 2019).

Social Context

When asked, the educator stated that their primary objective in the classroom is passing their learning down to enrich the lives of their stakeholders, their students (City et al., 2018). Through support, these initial stakeholders, parents, administrators, and peer educators are offering additional support to the classroom educators' process and giving stability to the student stakeholders (City et al., 2018; Nowikowski, 2017). For some students, just putting on the *white coat* and changing their negative self-talk language into positive language is enough for them to start seeing success in the sciences (Jones et al., 2021). While rural life can be a struggle for students in numerous ways, learning how to be successful in core content areas should be prioritized.

By providing educators with specific training in the content areas and focused scaffolding of more complex concepts, students can feel more supported when facing new concepts and with the material (Institute of Educational Science, 2022). Setting goals with the educator allows for scaffolding and positive perceived progress, which may be significant to the overall view of the subject matter, as the students advance (Institute of Educational Science, 2022; Smolucha & Smolucha, 2021). These early positive progressions allow students to explore the content and materials, developing an appreciation for the application before being expected to excel independently (Hughes, 2020). The support can offer timid or unsure learners the chance to explore and investigate their way with minimal commitment until they reach a point of assurance for self-determined exploration (Russo et al., 2021). Educators who are taught integration using the SMART Goal planning collaborative cycle show a more complete and rounded understanding of concepts (Bapoğlu-Dümenci et al., 2021). The importance of educators remaining current and informed so they can model for students has remained a topic of inquiry, especially post-pandemic (Mahmood, 2021).

Without appropriate assistance or scaffolding by educators, content material can be seen as unimportant and too tricky, becoming a source of student avoidance (Stewart, 2009). These feelings and perceptions can lead to turning away from the subject matter, or an ongoing perception of inadequacy, which has long-standing effects unless directly addressed to the student. Benden and Lauermann (2022) explained that once a student has decided they are unlikely to "be good" (p. 1063) or "like" (p. 1067) the subject due to ease with the content, they are unlikely to return and change the perception in the future. The idea is especially true in female students with STEM-related topics or fields once they have progressed to the secondary level (Makarova et al., 2019).

Classroom modeling procedures with academic achievement language and content knowledge before setting written goals can show students how their ideas can be applied on paper (Eun, 2019). Specifically, when educators are modeling for students, they may receive more exposure to higher order thinking skills. In math and science, making writing clear and measurable goals easier with the exposure and follow-up can merge what the educator has learned and what they can demonstrate. Eun (2019) summarized developing and deepening the learning relationship between peer-to-peer educators as an ongoing process for growth and practice.

The importance of educators planning STEM integration into a lesson can help educators see the purposeful results (Ertmer et al., 2018). Initial examples outlined by other educators to see what portions are specific, measurable, attainable, relevant, and time-bound are seen as beneficial. Wexler (2020) supported the idea by sharing relevant background knowledge that can be essential to comprehension. As educators progress and become more skilled with both the academic and goal-setting procedures, the attainability of their individually set goals becomes more concrete. The benefit can also be seen by the educators who report increased confidence, achievement in their classroom, and improved preparation, and who implement SMART goal planning (Ertmer et al., 2018).

Theoretical Context

The theoretical context is influenced by Locke's Goal Setting Theory, which was developed in 1968 (Locke & Latham, 2019). Based on the five tenets: clarity, challenge, commitment, feedback, and complexity. Together, they allow learners to set and reach goals at all levels. Setting goals is a routine part of the education landscape in early elementary schools. Students are required to be able to understand, strive, and work toward proficiency in essential concepts and skills within the first year of their education or be left behind as others progress. Developing a more student-centered and student-controlled learning environment leads to deeper student engagement, starting with the educator's scaffolding. However, this must be modeled, mentored, and learned by students through the educator (Fauth et al., 2019). Goal setting and goal reaching are growing processes educators can teach as young as kindergarten using scaffolded steps (Caena & Vuorikari, 2021). The skills required to access more profound and meaningful learning are habits that must be taught to students by the educators they encounter (Aghera et al., 2018; Hughes, 2020).

Professional educators are tasked to become experts in the classroom in their subject and grade level each year, using their judgment and curriculum to guide them (Urhahne & Wijnia, 2021). How we acquire new learning must be considered to best support educators' ongoing education before being able to practice the skills with students (Lerdpornkulrat et al., 2019). When considering how we "learn to learn," the practice requires grit, determination, and often resilience when done in an isolated setting (Midwest Comprehensive Center, 2018, p. 2). As educators, we use the knowledge of others to develop understanding in ourselves. Learning by doing or through modeling of others follows predictable steps. If the learner’s initial encounter is met with positive feelings or success, they can move on to more complex tasks. The learner also receives a sense of growth with scaffolding; they continue to seek to repeat pursuing more complex tasks (Smolucha & Smolucha, 2021). The assurance that they can seek support, if necessary, helps to encourage discovery.

One of the challenges brought to the surface due to virtual teaching in the last few years is distance and lack of availability of standard professional learning for educators in rural districts (Cromartie, 2020; Mahmood, 2021). The challenge has also created an increasingly tightening shortage of quality educators nationwide, particularly in rural settings (Caena & Vuorikari, 2021). Previously designed in-person courses are becoming less available, but the need for professional learning continues to increase with the variety of experiences (Laux, 2021). Another unexpected downside of the educator shortage is that substitutes can be a struggle to attain, making it more difficult for rural educators to attend training even when training is available through the local service centers (Miller, 2020). The problem can lead districts to struggle to educate new and returning professionals when students have limited personnel.

Problem Statement

The problem is that STEM SMART goals are underrepresented in rural elementary educators' planning and implementation. The lack of exposure and foundational knowledge leads to fewer students pursuing and understanding STEM at the secondary education level and post-graduation careers (Felder & Brent, 2024). The problem can be attributed to the location (Ardoin, 2017), proximity to professional education resources (Brodie, 2019), retention of personnel (Drescher et al., 2022), and implementation accountability (Texas Educational Agency, 2019).

Presently, there is a need for this study due to the high population (57%) of Texas School districts and schools being classified as rural (Texas Educational Agency, 2019). The percentage is more than double the national average for rural schools, approximately 24% (National Center for Education Statistics, 2020). Without specific training and targeting, the integration of STEM earlier in education through educators and the percentage of students with low exposure continues to grow. Educators may struggle to receive the proper support and training and implement goal setting in their classrooms when they may not fully understand or buy into the initiatives. The State of Texas Assessment of Academic Readiness (STAAR) test also can add to educators' concerns when they feel they must *be ready* for the test or *teach* to the test (Texas Rural School Task Force, 2017; Wang et al., 2019). The pressure can be partly due to financial assurances resting on the student outcome. In Texas schools, financial allotments and grants are given or withdrawn based on the A through F rating system, which is tied and scored based on student achievement (Showalter et al., 2019).

With more than half of all rural students residing in only 11 states, the problem of rural achievement extends beyond Texas (Showalter et al., 2019). Achievement gaps and access to resources are only part of the education problem in the rural district. The accountability of educators to the state through standardized testing needs to produce well-rounded and problem-solving thinkers in the areas of STEMS education. The literature supports intervention at the secondary level with more integration into STEMS areas, such as robotics and accelerated courses for exposure to concepts (Bapoğlu-Dümenci et al., 2021; Drescher et al., 2022; Makarova et al., 2019).

However, increasing research shows that students in rural settings need the foundations in the pre-STEMs (math and science) areas to keep pace with the courses when they arrive at the secondary level (Drescher et al., 2022; Makarova et al., 2019). The unpreparedness and unequal foundation can be seen in elementary students' planning, implementation, and exposure to these core concepts (Benden & Lauermann, 2022; Bostwick et al., 2020; Texas Educational Agency, 2019). If educators can increase exposure to SMART goal setting and encourage growth, students could be ready for secondary-level opportunities (Johnson, 2004; Laux, 2021). The ability to learn how to use SMART goal setting may also offer educators a chance to monitor better and help refine goals, leading to more successful outcomes (Johnson, 2004; Locke & Latham, 2019).

Purpose Statement

The purpose of the transcendental phenomenological study is to describe the experience of elementary educators planning and implementing STEM SMART goals in rural North Texas classrooms. At this research stage, the planning of STEM SMART goals is defined by referring to specific, measurable, attainable, relevant, and time-bound goals (DeLeon et al., 2019; Ertmer et al., 2018). The theory guiding the study is Locke’s 1968 Goal theory. Data was collected through interviews, focus groups, and questionnaires to explore the purpose of the study. Participants in the elementary setting in third, fourth, and fifth grade based on their lived experiences teaching math and/or science were critical to shaping the research’s outcome. The educators are applying Locke’s goal-setting theory and exploring the planning, implementation, and professional learning factors that may affect the educators experiencing the phenomenon, contributing to the body of research with their perspective.

Significance of the Study

STEM exposure continues to grow, becoming both recognizable and has even made its way into popular culture, including a season’s worth of exposure on Sesame Street in 2012. Even with the commonality of STEM ideas for children, many students still lack the tangible experience in their own school setting and purposefully initial exposure to the material and content (Deville, 2023). Rural educators are vital to districts nationwide, as they serve more than half of the nation's most rural students and offer the initial chance to develop student awareness of the foundational STEM concepts (Showalter et al., 2019). Rural educators' significance directly affects the potential workforce with values, exposure, problem-solving, and long-term goal striving. The practical and longitudinal impacts that early exposure may provide could be developed by better understanding and effecting change based on the lived experience of the educators presently implementing and planning the content.

Historically, The United States Department of Education (USDOE) has developed plans, programs, and funding to promote STEM education in schools nationwide, beginning at the secondary level (U.S. Department of Education, 2023; Deville, 2023). When these students are educated, they have perspectives and skills because their place of residency could benefit and grow the STEM field (Ardoin, 2017). Even if these students return to rural areas after being educated, they can apply solutions to improve the areas of agriculture, mechanical, and technical fields, sustaining these rural communities (Ardoin, 2017; Texas Educational Agency, 2019).

Despite funding, educators continue to struggle with integration and execution in their classrooms. The current initial and summative assessment plans presently in use in elementary school settings across Texas are to continue to raise rigor and thinking. However, they can lead educators to question the process of achieving these outcomes (Texas Education Agency, 2017; Texas Educational Agency, 2019). Without proper training or modeled learning opportunities, the educators may not know how to take the resources and make them part of the lesson, session, or planning at the grade level they are teaching. The result could be that billions of dollars of resources are unused, unapplied, and not benefiting the students (Johnson, 2022; Laux, 2021).

Locke's (1968) goal theory was used to investigate the topic of SMART goal setting with students and to measure goal progress in the elementary learning environment (Locke & Latham, 2019; Shabani et al., 2010). Locke and Latham (2019) elucidated developing a more student-centered and student-controlled learning environment is shown to lead to deeper student engagement. When it comes to achieving success, SMART goal setting, coupled with Locke's Goal theory, can be a powerful tool for learners of all types (Latham, 2020; Leonard & Watts, 2022). Consideration of the theory of motivational goal setting with educators during the planning and implementation phases of the research in the core content may show better long-term acquisition of the pre-STEM concept, which is necessary for complete development in future academic concepts.

By focusing the significance of the study on the theoretical, historical, and social effects of the lack of STEM professional development and SMART goal application, the concern of student exposure is addressed (Ardoin, 2017; DeLeon et al., 2019; Ertmer et al., 2018). By leveraging the information and adapting how we educate our educators, the impact on long-term success can be better addressed in more rural locations (Texas Rural School Task Force, 2017).

Research Questions

The research's overarching themes are goal planning, implementation, and rural factors that may interfere with or prohibit learning (Drescher et al., 2022). These rural factors potentially should be considered for Texas, as it comprises the nation's most rural schools and school districts (National Center for Education Statistics, 2020). The research evidence denied the need for initial and additional follow-up training in SMART goal planning for educators. SMART Goal planning was tracked throughout the research time frame and, in response, reported based on the experience of the educators in the trenches of educational planning. Educators were encouraged to describe and discuss their experiences based on successes or challenges. Potential rural factors broadly impacting educators' understanding of the challenges and success could better inform the research at the elementary level.

As educators consider teaching students to initiate and track goals more independently, understanding challenges and success would be a valuable perspective (Passmore et al., 2021). The long-term goal outlined by Locke's goal planning is for educators to take control of their learning and independently monitor the final achievement of self-set goals (Locke & Latham, 2019). Goal proficiency for educators can be achieved by breaking goals into smaller and more attainable sections so there are markers throughout the goal tracking. Once taught and modeled, goal planning can be used to set and reach personal or academic milestones.

Central Research Question

What are the experiences of elementary educators in planning STEM SMART goals?

Sub-Question One

How do elementary school educators describe clarity in planning STEM SMART goals?

Sub-Question Two

How do elementary school educators describe the complexity and challenges of planning STEM SMART goals?

Sub-Question Three

How do elementary school educators describe commitment and feedback in planning STEM SMART goals?

Definitions

1. *Clarity* – The measurable, specific, written, or planned method for achieving a task or goal, as defined by the five tenets of Locke's goal theory (Locke & Latham, 2019).
2. *Challenge*- The difficulty level is defined by the learner and used as motivation for achievement or completion of the task, as defined by the five tenets of Locke's goal theory (Locke & Latham, 2019).
3. *Commitment*- The attachment, commitment, or accountability assigned to the task or goal, as defined by the five tenets of Locke's goal theory (Locke & Latham, 2019).

4. *Complexity* – The degree or level of difficulty, rigor, or challenge that engages in the goal or task, as defined by the five tenets of Locke's goal theory (Locke & Latham, 2019).
5. *Feedback*- The chosen method of receiving the information, refinement, or redirection related to the goal or its progress, as defined by the five tenets of Locke's goal theory (Locke & Latham, 2019).
6. *Learning Community* **-** Grouping educators and educators into cohorts or sections by content for instruction provides alignment and cohesion for shared common objectives (Harvard University, 2015).
7. *Professional Learning* – In-person or online learning sessions are accessible for educators for continuing growth and educational learning (Region 17 Service Center, 2023).
8. *SMART* – Specific, Measurable, Attainable, Relevant, Time Bound will create intentional and clear expectations based on the combined portions of the goal writing outlining and defining success (SAMHSA, 2022).
9. *STEM* **-** Science, Technology, Engineering, and Mathematics (U.S. Department of Education, 2023).

Summary

In Chapter One, the study sought to explore the problems and purpose of planning STEM SMART goals for elementary educators in rural North Texas. As informed by the background and social research, educators struggle with understanding, planning, and implementing STEM SMART goals in the classrooms (Johnson, 2022; Laux, 2021; Showalter et al., 2019). A growth plan may be developed by examining and identifying the factors that challenge and lead to successful implementation in rural communities. Research may inform educators in their classroom planning by focusing on professional learning opportunities and knowledge gaps (City et al., 2018).

Without intervention for educators in STEM planning, the impacts on educators and students in the field of STEM could be negatively affected (Johnson, 2022; Laux, 2021; Showalter et al., 2019). These adverse effects potentially lead to a dramatic decrease in STEM-required knowledge, fewer able to fulfill the requirements to qualify for STEMs at the secondary level, and fewer STEM job opportunities upon exiting the secondary level of education (Laux, 2021; Showalter et al., 2019). The research’s potential long-term impacts could help model and create a smoother integration of professional knowledge and problem-solving while also highlighting the importance of STEM for educators (Laux, 2021). The first steppingstone is the ability to provide and equip educators with tools to become more relevant for their communities (Gereluk & Corbett, 2020). As educators learn and practice the strategies with more fidelity, they open doors for all students walking through their classroom (Ogonosky & Mintsioulis, 2020). Through training, modeling, and mentorship, these opportunities could build communities and move the nation’s learners toward prosperity (Visually, 2023).

The potential application could also be extended to more adaptive professional learning, support in rural districts, and uniformity in building a student-centered elementary approach to STEM education (Johnson, 2022; Laux, 2021; Showalter et al., 2019). Chapter Two will provide a literary basis that informs and affects educators' learning in the rural setting. Outcomes using appropriate adjustments better inform and involve students regardless of where in the state the educator is located, providing equity and more equality for future STEM educators and learners (Stewart, 2009; Wang et al., 2019).

CHAPTER TWO: LITERATURE REVIEW

Overview

A systematic literature review was conducted to explore SMART goal planning and implementation in pre-STEMs areas at the elementary classroom level in rural North Texas districts. In chapter One, SMART is the acronym for specific, measurable, attainable, relevant, and time bound. The pre-STEM areas being used in the study were science and mathematics. These pre-STEM areas are being considered for the purposes of the study due to the content level of the students being affected, and students need to master these foundational skills before progressing to engineering and advanced technology. The literature examined the problem of low SMART goal planning and integration in math and science classrooms as affected by rural factors. Low or absent goal setting can lead to low academic performance, accountability concerns, and perceptions of low academic achievement in these pre-STEM areas. The state of Texas contains the most rural schools compared to other states across the nation and is significantly affected by the setting when considering educational scores (Texas Education Agency, 2017; Wang et al., 2019). DeLeon et al. (2019) stated that these challenges were also a consideration for educators' alignment with the Texas Essential Knowledge and Skills (TEKS) standard, a guiding principle of Texas high-quality instruction. In addition to the high number of rural settings in Texas, the state also has the highest percentage of rural students attending public education in the nation (Texas Education Agency, 2017). The research consideration cited on the topic of rural STEM education and SMART goal planning may inform other highly rural states with similar rural education populations. In Chapter Two, the researcher reviews the current literature related to the topic of study and areas of consideration for educational improvement, such as professional education, rural schooling, and STEM integration.

Theoretical Framework

The theory most relevant to SMART goal setting is Locke’s goal-setting theory as advanced in the education setting (Drucker, 2007; Latham, 2020). Locke's Goal theory is divided into five sections based on his 1968 proposal: clarity, challenge, commitment, feedback, and complexity. The five tenets are used individually and as a set to reach goals and milestones at a highly evolved level with the application. The idea also allows new goal-setters to check in and allow for self-reflection while addressing individual aspects. When starting, writing out each section may help the learner to remain accountable to the timetable and keep motivation high even through challenging sections (Latham, 2020).

Locke first presented his goal-setting theory in a 1968 article titled *Toward a Theory of Task Motivation and Incentive* for review by his peers (Locke & Latham, 2019). Originally, goal theory was developed to help with project management in the business setting in the 1960s. The theory allows the project to be implemented using short-term, long-term, or a combination of goals to produce work at a highly maintained level (Latham, 2020; Locke & Latham, 2019). The theory uses motivation as an incentive for each step completed, thus leading to an emotional release in the body and a sense of fulfillment (Berkman, 2018). Goal theory describes the completion sense as generally positive, typically coupled with dopamine and endorphins even before the review or feedback is given (Berkman, 2018; Wexler, 2020). The more desire is built up, the greater the return, whether in a positive or negative way, if it remains unmet (Brown, 2017, 2022). The second emotional connection in goal setting is seen when feedback, either positive, negative, or mixed, is received by the creator of the goal. Based on the feedback received, the cycle may cease or continue based on the desired outcome for the goal and its goal-setter (Latham, 2020; Latham & Locke, 1991, 2007; Locke & Latham, 2019).

The theory connects to recent literature about professional educator learning, curriculum development, and rural factors affecting educational outcomes (Locke & Latham, 2019). The literature illustrates that goal setting for academic performance using SMART and classroom implementation can lead to more effective monitoring and striving development (Locke & Latham, 2019). The impact of a lack of understanding connected to professional educator learning and planning can be understood through Angelou’s quote: an educator who "knows better, they do better, and when they do better, students can do better” (Winfrey & Angelou, 2015, pp.84-85). Through educators understanding the importance of and committing to following through with classroom action, long-term SMART goal planning can be perpetuated and potentially offer additional opportunities not previously attainable for students.

Finally, the need for the current study is addressed by identifying gaps in the literature regarding rural district discrepancy for SMART goal setting, SMART goal planning, and implementation. The gaps in the literature may be traced to a lack of formal training in SMART goals implementation, pre-STEM content knowledge, and personnel due to educator pool shortage. Each of these concerns may produce educational inequity not found in larger or more funded areas in Texas. The need for goal setting and content scaffolding may help to raise the low performance of rural Texas districts (Stewart, 2009).

Related Literature

Professional educators’ ability to access equal education regardless of physical location is considered a high priority across the state (Mahmood, 2021; Miller, 2020). Equal access has become especially pressing and relevant after COVID-19 forced the majority of Texas to educate through online means (Mahmood, 2021; Wang et al., 2019). Goal setting has evolved from a few tenets for measuring criteria to a succinct and measurable way to monitor progress (Latham, 2020; Locke, 1968; Locke & Latham, 2019). With educators receiving appropriate instruction, they too can access and reach success through planning and modeling the concepts that have longer standing impact on students. Texas is leading the nation in rural schools and school districts, and the ability to use research-based interventions in the classroom to raise academic performance is necessary to sustain equal educational access (Texas Education Agency, 2017; Wang et al., 2019). The access also provides STEM employable access that potentially can change the course of the learner's future outlook.

Five Areas of Connection

There are five tenets of goal theory aligned with the five tenets of SMART goal planning to help learners succeed. Learners can standardize their approach and track goal setting by breaking down the goal-setting process into manageable parts (Leonard & Watts, 2022; Locke & Latham, 2019). The idea also allows new learners to check in and allow for self-reflection while addressing individual aspects. When beginning, writing out each section may help the learner to remain accountable to the timetable and keep motivation high even through challenging sections (Latham, 2020).

According to Locke's goal theory, clarity is the first step toward success (Latham, 2020; Latham & Locke, 1991, 2007; Locke & Latham, 2019). Clarity aligns with specifics when integrating SMART with goal-setting tenets (Latham, 2020; Leonard & Watts, 2022). In order to create a successful strategy, it is of utmost importance to have a well-defined and specific goal in mind, regardless of whether you are a first-time or experienced learner (Locke & Latham, 2019). The specificity begins with identifying whether the goal is procedural, process, or product based. Explicitly outlining a clear vision of what the goal is going to be achieved, the areas to improve upon, or the accomplishments, lays a solid foundation for success (Latham & Locke, 1991, 2007;

Locke & Latham, 2019). If the goal writer employs a standardized approach, then the procedure requires less uncertainty than a goal with an unclear objective (Latham, 2020; Latham & Locke, 1991, 2007; Locke & Latham, 2019). By setting clear goals and objectives, the learner can ensure they are on the right track toward success.

Feedback plays a crucial role in determining the level of progress achieved in goal and goal planning (Latham & Locke, 1991, 2007; Locke & Latham, 2019). Feedback aligns with Measurable when integrating SMART with goal setting tenets (Latham, 2020; Leonard & Watts, 2022). As Locke (1968) stated, feedback is how a learner receives the information, refinement, or redirection related to the goal or its progress (Locke & Latham, 2019). Without clear and measurable feedback, improvements made while setting goals may not be replicated in the future (Latham, 2020). By analyzing feedback and identifying errors, learners can adjust and achieve more promising results. The in-action adjustment allows the learner to use refocusing as a refinement to complete and reach the goal more completely (Locke & Latham, 2019; Leonard & Watts, 2022). Therefore, feedback is a critical component in attaining measurable progress during the goal-setting process, leading to higher levels of success and achievement (Locke & Latham, 2019). Feedback provides necessary insights into what is effective and not effective, specific to the learner, ensuring learning is consistent and cyclical (Latham, 2020; Latham & Locke, 1991, 2007; Locke & Latham, 2019).

Complexity varies from person to person and can be personal without a standard metric to measure growth until it is applied to the task or goal (Locke & Latham, 2019). Complexity aligns with Relevance when integrating SMART with goal-setting tenets (Latham, 2020; Leonard & Watts, 2022). Complexity must be flexible and cater to the learner's capacity, individual rigor, and ability level. The complexity must be within the capability of the goal writer. Otherwise, the goal becomes unattainable, and the learner will lose motivation to progress (Locke & Latham, 2019). By aligning complexity with the relevant portion of the goal-setting process, learners can tailor their goals to their unique situations, making them more attainable (Latham, 2020; Latham & Locke, 1991, 2007; Locke & Latham, 2019). More favorable results can be achieved by adjusting based on feedback and identifying errors through metrics (Latham & Locke, 1991, 2007). By analyzing feedback and identifying errors, more promising results can be achieved. Therefore, feedback is a critical component in attaining measurable progress during the goal-setting process, leading to higher levels of success and achievement (Latham, 2020; Latham & Locke, 1991, 2007; Locke & Latham, 2019).

In the goal-setting process, value should be placed on aiming for attainable challenges in goal progression (Latham, 2020; Latham & Locke, 1991, 2007; Locke & Latham, 2019). Challenge aligns with attainable when integrating SMART with goal-setting tenets (Latham, 2020; Leonard & Watts, 2022). By carefully selecting targets that can be accomplished with a combination of time, effort, and support, a sense of achievement is fostered for the learner (Latham & Locke, 1991, 2007). Although professional goal setting can be daunting for educators, it can also be empowering if the learning is set for genuine growth (Leonard & Watts, 2022). Even if goals are long-reaching or seem out of the learner's range, areas, such as time or increments, can be implemented to reduce the challenge level at each step. Breaking down larger objectives into smaller, more manageable sections can inspire confidence and motivation, serving as steppingstones towards more significant progress (Latham, 2020; Locke & Latham, 2019).

Commitment is a crucial aspect of the timebound portion of the goal-setting process (Latham, 2020; Leonard & Watts, 2022). Allocating specific amounts of time and being accountable for progress is essential to achieving the learners' goals (Latham, 2020). Without a well-defined timeline, learners may struggle to stay on track and risk falling behind or succumbing to procrastination (Latham, 2020; Locke & Latham, 2019). Adopting a time-sensitive strategy and explicitly stating or writing it down allows the learner to take responsibility for one's advancement. The understanding of the timing element is a factor that can make or break the achievability of a goal or task (Locke & Latham, 2019). The ability of each learner to take the appropriate time to reach an objective may require adjustments along the path of the goal (Latham & Locke, 1991, 2007). This is especially true for new learners who may feel inclined to over or underestimate the time necessary to reach significant objectives. Learners can gradually build momentum and snowball towards even greater success through incremental steps or multiple checkpoints along the goal trajectory (Latham, 2020; Latham & Locke, 1991, 2007; Locke & Latham, 2019).

Goal Research

Locke's (1968) theory can also be applied to examine the problem of low academic achievement in math and science and how the application of goal setting can improve performance outcomes. The motivation toward the objective is enhanced through the use of feedback on the goal, improving the overall performance on new or challenging material. The concept of breaking goals into specific sections to address time management, measurable progress, and end-goal analysis allows monitoring to remain on target (Latham, 2020; Leonard & Watts, 2022). SMART goal planning defines itself by taking goal planning and adding relevance and attainability. For educators and students, goal planning allows them to focus on incremental progress toward larger goals, such as specific proficiency criteria on state assessments. Diefes-Dux et al.'s (2016) research study supported and expanded Locke's research by supporting a growth mindset through the use of the SMART goal model. The increase in support led to higher engagement, motivation, and exploration of STEM subject matter, which was seen to strengthen background connections (Passmore et al., 2021; Rosenshine, 2012; Russo et al., 2021). The type of goal setting is also completed progressively, making the steps more manageable for the learner to begin building momentum and acquiring momentum in a specific subject matter (City et al., 2018).

In the 1990s, educators realized the benefit of having students develop specific, measurable, and actable educational goals (Texas Educational Agency, 2019). By using SMART (specific, measurable, attainable, relevant, and time-based) goal setting, students achieve better goals based on defined parameters and more realistic academic results (Aghera et al., 2018; Leonard & Watts, 2022; Passmore et al., 2021). Latham and Locke's (2007) research support the idea by stating that students who set goals to assess their performance and task completion improve their regulatory ability and show growth in their learning cycle.

The results were a long-term positive correlation between task performance (Benden & Lauermann, 2022) and an increasingly positive link between goal setting and task performance (Benden & Lauermann, 2022; Latham, 2020). Over time, studies also have shown a positive correlation between task performance and a positive link between goal setting and learning (Ivana, 2020). Most mentioned in educational goal-setting literature is the connection between goal setting and people skills required for living in society (Midwest Comprehensive Center, 2018). These skills include coordination, self-assessment, internal motivation, and student discourse in and out of the classroom. The internal and regulatory processes were seen as a strong indicator of student success compared to end-stage goal completion. The Midwest Comprehensive Center (2018) continues those skills directly modeled and taught to students by educators. Students must practice with the dynamics before executing them independently in a real-world setting.

Importance of Educational Goal Setting

Setting goals is an integrated part of education, as young as first grade, when educators expect students to write about aspirations for when they grow up (Caena & Vuorikari, 2021). The informal first writing of long-term goals is personal and connected to the student's inner desires for their life outcome. While the first goal is rarely achieved when students grow up, it provides a model of how passion, connection, and planning can be used to set goals. The stages of learning begin with a self-guided pursuit based on the subject's knowledge, such as the initial exploration of a topic or interest (Smolucha & Smolucha, 2021). When the learner arrives at something they cannot master independently, they then move into the second stage. The learner moves into guided assistance or scaffolded with another who can teach or model the process. The learner moves toward automaticity, requiring less help with each attempt based on the support they have received (Shabani et al., 2010). Finally, the learner reaches the stage requiring no help, allowing them to continue their understanding until assistance on the next perplexing task is needed (Eun, 2019). These steps are the same when educators are learning and are a connected way for educators to experience the learning process before returning to the classroom to instruct their students.

However, if a learner does not naturally excel in math or science, planned goal setting may be an avenue to help them successfully learn. With the help of an advisor or educator, students can improve their scores in math and science (Benden & Lauermann, 2022; Makarova et al., 2019). Educators can facilitate students' learning skills, such as time management, taking ownership of their learning, and goal setting with attainable check-in capacity to manage learning (Midwest Comprehensive Center, 2018). Goal setting can also resemble one-on-one sessions, peer or homogenous groups, or whole groups, if the goal involves a more extensive setting (Latham, 2020; Passmore et al., 2021). The joint plan can be modified to affect students more with personalized sessions to improve individual learning.

Accountability by Goal Tracking

The area of refinement in an unmet or unreached goal offers an additional opportunity to deepen the connection between goal setting and the measurable goal (Latham, 2020; Latham & Locke, 1991, 2007; Locke & Latham, 2019). Refinement offers a chance for the goal-setter to experience productive struggle, leading to a passage from scaffolding to supported learning (Russo et al., 2021). Students and educators can also benefit from Locke's (1968) discovery of the emotional connection in goal building when they plan, set check-ins, and reach the end of the goal (Berkman, 2018; Locke & Latham, 2019). These messages can cause long-term changes to the brain and lead to additional goal setting and goal-striving (Berkman, 2018).

The National Council of Educators of Mathematics (NCTM) conducted a study specifically addressing educator strategies to aid in proficiency in goal achievement (Bostwick et al., 2020). The most effective strategies, as reported by educators, were providing feedback on a frequent basis, chunking tasks of a complex nature, and allowing the learners to apply and practice their knowledge in a meaningful way. These suggestions and strategies align with incorporating SMART goals in the curriculum planning to benefit students' math and science outcomes. Additionally, students can share accountability and responsibility for their learning and demonstrate connective growth with educators as they progress (Weinstein, 2020). The shared educator-student responsibility allows students to develop more explicit expectations, directions, and self-guided instruction (Ertmer et al., 2018).

Rural School Effect

Rural schooling accounts for approximately one-third (32,000 students) of all public school districts in the nation (National Center for Education Statistics, 2020). Rural communities are divided into three classifications: remote, distant, and fringe. Each classification is divided due to the proximity to urbanized areas instead of based solely on population size due to overlap and changing territory lines. The number of enrolled rural school students makes up 24% of the national average compared to 34% in suburban areas and 29% in urban areas. The lowest enrollment numbers can be attributed to population, small school size, and the decline of smaller rural communities (Gereluk & Corbett, 2020). Challenges faced in rural areas are commonly classified into financial, accessibility, personal, and sustainability (Gereluk & Corbett, 2020; Rumberger et al., 2017).

National Rural Schooling

Students from rural backgrounds often face complex and life-altering decisions due to rural factors once they reach higher education (Showalter et al., 2019). Due to the limited educational opportunities in rural areas and financial and geographic factors, students face more direct challenges to furthering their education (Rumberger et al., 2017). These factors may be prohibitive to success and furthering growth, which is why the strength of foundational knowledge is especially important (Dick, 2017). Challenges may include location, transportation, access to knowledge, and further educational opportunities.

Improving schooling in rural areas is in educators' news, national reporting, and minds due to inequities brought to the forefront since the 2019 COVID outbreak (DeLeon et al., 2019; Mahmood, 2021; Wang et al., 2019). The disparities were seen predominantly when schools shutting down made online education the sole source of educational opportunity for many families nationwide (Wang et al., 2019). Preparation of the specific challenges faced in a rural setting is not always apparent to young or first-year educators until they begin to experience inequity in accessibility compared to their classmates (García & Weiss, 2017). At the same time, rural schools have become more technologically accessible and have certainly grown in their access to the internet, social media, and devices (Kismihok et al., 2020). Families with machines and the internet had less of a trial trying to maintain education and normalcy for structure (Wang et al., 2019). Even before online schooling, devices available in the homes of rural students were typically centered around communication and were agriculturally based (Drescher et al., 2022; Rumberger et al., 2017).

Rural schools face challenges not limited to their location but to the capabilities to keep up with the fast-paced instruction and educational technology needs (Showalter et al., 2019). However, many rural schools needed the devices and the ability to offer internet or internet devices to students who may have lived as many as 30 miles from the school building in which they attended (DeLeon et al., 2019). The accessibility of student transportation, considering the large service area of the students needing access, can present hidden challenges (Gleason et al., 2008; Spencer, 2000; Yeung & Nguyen-Hoang, 2019). These farm-to-market roads can also become impassable, making students more likely to walk to a centralized location for pickup before getting on public transportation (Cromartie, 2020; Drescher et al., 2022).

Texas' Rural School

Rural districts may feel the brunt of the inequities as they try to keep up with and share the limited state or national financial contributions (Texas Rural School Task Force, 2017). In Texas, schools across the state are attempting to balance increasing academic performance (Every Student Succeeds Act, 2015), transparency (Texas Educational Agency, 2019), and providing high-quality instruction and material while ensuring students are ready for the state standardized test (Texas Education Agency, 2017). For an educator, many of the curriculum pieces are used or being administered through online means in an effort to build stronger endurance and increase rigor (Texas Education Agency, 2017, 2023). The online potential is a way to make it more accessible for the school district to receive higher quality materials and curriculum, especially in Mathematics and English Language Arts. Texas sees the shifting toward online materials as a way to help provide more equity in the learning process.

The heavy load of responsibility can leave educators and administrators feeling overwhelmed, especially if they know they are struggling to keep up with the current pace of instruction (Gereluk & Corbett, 2020). High-stakes testing is not new for Texas, and state testing began in the late 1980s but has ramped up as accountability ties closer to state funding (Texas Educational Agency, 2019). The challenge faced by Texas is how to align when rural schools' opportunities, resources, and funding, which are limited by location and context. The "one size fits all" teaching model can be limiting and leave vulnerable populations and rural schools scrambling to cover material while students struggle with outside factors (Forner, 2016, p. 4).

North Texas Rural Schooling

For many students, the struggle of their rural geography can be seen as soon as they begin school and affects decisions even when they go to college (Ardoin, 2017; Rumberger et al., 2017). At the same time, not just the physical proximity to the school but also the condition and accessibility can be a struggle to learn. School transportation is often a more effective transportation model for students who do not live in the city limits of rural schools (Ardoin, 2017; Spencer, 2000). Concerns about how far from home a student lives or can be expected to walk, or ride, can be a limitation for families. While students in rural settings can access the public-school bus to meet their educational needs when being transported to and from campus, extracurriculars, advancement, enrichment, and remediation can pose more of a challenge to access. Additional factors can affect the accessibility to participating in after-school programs and receiving additional services, such as tutoring and zero-hour studies (Ardoin, 2017). Even though these services may be available, access to them may challenge student participation.

When students reach high school and post-secondary school, many rural students must consider the acceptable distance from home to ensure they can still live and work (Ardoin, 2017). Distance considerations can be seen in the high percentages of rural students who chose two years or junior college within their community rather than leaving home and incurring experiences farther from home (Ardoin, 2017; Sher, 2020). The limited availability of advanced studies within the institutes also makes it less likely that there will be opportunities for higher-order STEM careers than offered at four-year universities. The present percentage of Texas with no post-secondary education is 61.8% of the state compared to 27.9% of the nation (Texas Comptroller of Public, 2022; U.S. Census Bureau, 2022a; U.S. Census Bureau, 2020). The effect on Texas students who do not pursue further education after high school earn between 17-38% less than the national average because they are without secondary education access (Texas Comptroller of Public, 2022; U.S. Census Bureau, 2022b).

Learning to Learn

In 1920, Vygotsky noted that while we as learners acquired language quickly through natural exposure, content, such as math and reading, required more hands-on intervention (Eun, 2019). Universal goal-setting intervention can be adapted and provided to all learners regardless of their level (Frommelt et al., 2023; Ogonosky & Mintsioulis, 2020). The research supports acquiring more complex subject matter; people require the intervention, instruction, or guidance of someone who has already mastered the material (Eun, 2019).

One of the post-pandemic tools is video coaching for educators to become more reflective and connect more deeply with peers or administrators (Hofer, 2023). In a growing number of districts, the shortage of educators is combated through alternative professional learning (Hofer, 2023). The shortage and scarcity of time for professional education are provided through video modeling for educators to interact with and watch. Using modeling and 2-way video coaching helps refine instructional practices, and educators begin to focus on deepening their teaching practice. Hofer (2023) stated that while “not the perfect solution” (p. 2) to professional learning, it does offer the opportunity for questioning, guidance, feedback, and refinement.

One such way would be seeing the master educator model and monolog as they work through video modeling (Hofer, 2023). Video modeling offers a chance for instruction on the educator's schedule and can be paused, rewatched, and reported as they are learning to perfect a new skill or grasp a complex task. Hofer shared that the internalization of seeing others work through similar situations specific to their classroom can also aid in the connection. The connection can foster a chance for educators to lean on the background knowledge of these adults and peers to continue building toward proficiency. Hofer suggested that peer connection between educators and students brings belonging and purpose to the classroom environment. Video modeling creates a sense of belonging and impact, can help educators grow, and encourage them to remain in the district for years to come (Goodyear et al., 2019; Hofer, 2023). Retention of educators is crucial because Texas educators leave the classroom at twice the national average rate (Rosenblatt et al., 2019).

Tools for Learning by Doing

The importance of hands-on experience cannot be overlooked when involving the problem-solving approach, which has led to the development of Makerspace and STEM labs in schools nationwide (Vongkulluksn et al., 2018). The Makerspace and STEM Lab spaces strive to continue evolving through learning through doing and providing for all students learning styles. The U.S. Department of Education stated it this way, "In an ever-changing, increasingly complex world, it is more important than ever that the (students) are prepared to bring knowledge and skills to solve problems, make sense of information, and know how to gather and evaluate evidence to make decisions" (Hom & Dobrijevic, 2022, p. 1).

Gaming-based learning offers students as young as pre-kindergarten the chance to participate through movement, application, and problem-solving (Chen & Huang, 2020). These personal computers or gaming systems use interactive panels that allow students to combine exploration with a single or multiple-step sequence to solve or create a new solution to an outcome. While memory and working of technology improve with age, students can show aptitude based on creativity, cognition, and unique thinking that may need to be recognized in the academic setting. Garger and Guild (1984) felt a student's learning style can be as individual as a fingerprint, with areas of strength and weaknesses yet to be developed (Chen & Huang, 2020). While students gain from these spaces, educators who are exposed to new and innovative ways of addressing content help develop their connections alongside their students.

Specifically, the learner's ability to *sit* in a productive struggle while reasoning through to a solution is a skill to be embraced by educators and students (Vongkulluksn et al., 2018). Content educators, however, can feel like they can be excused from directly teaching the pre-STEMs concept when students attend rotational Makerspaces in the lower grades (Laux, 2021;

Nowikowski, 2017). Instead, educators should view these rotations as an additional chance to embrace the STEM concepts, helping to integrate these as additional exposures into their lesson plans (Laux, 2021).

Educator Professional Learning & Learning Communities

The outlook of professional learning shifted in education following the pandemic school closures of 2019 (Hill et al., 2020; Hofer, 2023). While closures for students and educators may have been short-lived in some places, it took longer for professional learning and educator classes to return, even at a distance. For many, they saw professional learning for educators as part of “learning apart, together” (Hill et al., 2020, p. 2). The caring relationship built on coming together to learn was a struggle for the first two years following the school closures. Areas like Canada moved from in-person sessions with peer or mentor educators to Zoom and distanced independent study for professional learning of their educators (Hill et al., 2020). While it allowed educators not to lack the ability to meet minimum required courses, it did not engage educators or promote innovative approaches according to course feedback (Forner, 2016). This aspect is viewed as necessary when educators learn or are tasked with acquiring new knowledge. Based on feedback, some educators and districts have had to rely on becoming more proactive in seeking inventive and creative ways to meet educators' needs for growth and learning (Han & Stieha, 2020).

In the last ten to fifteen years, there has been a movement in schools to move from the top-down leadership styles with educators toward the Professional Learning Communities (PLC) and cooperative learning groups within the educational models (Goodyear et al., 2019). The top-down is replaced with more educator-directed and student-centered models, as students’ requirements for learning continue to evolve. The PLCs offer an internal and rooted source of growth in the teams in which they are implemented. According to the Texas Education Agency (2022), PLCs are generally accepted as an educational group striving to learn, grow, and share commonalities in professional and learning outcomes focused on students and educators. PLCs focus on using discourse, problem identification, and solving to reach numerical or growth achievement (Goodyear et al., 2019). The PLC process centers around discussing, sharing, and modeling practices while incorporating data and meeting methods. The teams can be comprised of educators, staff, administration, or other personnel, all sharing common goals (Caena & Vuorikari, 2021; Goodyear et al., 2019). Participation and norms are set by those who function within them, setting educators at the helm of their student learning and creating solutions to solve learning challenges (Goodyear et al., 2019). If done correctly, they promote educator learning, implementation, and training, trickling down to student improvement.

In Continuing Professional Learning (CPD), educators are provided a baseline of opportunities to build and grow at the campus and district levels or higher levels (City et al., 2018; Goodyear et al., 2019). The movement to design future online professional development comes post-pandemic, as educators must find new ways to connect effectively. One of the more unique ways to engage educators in the more current CPD is through the use of social media and online sessions (Goodyear et al., 2019). The educator, trainer, or moderator instructing professional development learning may need to support social media-based training using the PLC process (DuFour,2021). Engagement and participation from those partaking in online discussions grew, as they could more easily access new material for their classrooms. The moderators, those teaching the PD, help to facilitate, promote, and lead discussion before turning over the topics for participant-led discussion through breakout or chat rooms. The idea of sharing practice while discussing in real time offered feedback and choices from participants walking together (Goodyear et al.,2019). The development of methods the educator walks away with can meet or exceed objectives previously set by their own or in-person session due to the collective community conversations. Goodyear et al. (2019) spoke to positive teaching practice, essential connection, and enhancing educators' engagement quality when they feel equipped.

STEMs Current Outlook

STEM education, remaining current with professional demand, has been recognized as an ongoing need over the last 20 years (Schrum & Summerfield, 2018). The Pew Research Center shows a growth of 79% since 1990 in the area of STEMS employment, making students twice as likely as their parents to require STEM in their employment (University of Central Florida, 2023). The intentional exposure to the STEM fields for girls as young as middle school can break the stereotypes developed by more male-dominated partiality in the sciences. The gender gap continues to widen in nearly all areas of career study and scientific contribution (Ross et al.,2022). For many women, STEM education can offer some of the highest earning potential in the areas of statistics, civil engineering, information security, profiling, and cyber security right out of post-secondary education (University of Central Florida, 2023). The teaming of engineers, mechanical renderers, and construction, with the practical knowledge of artists, graphic designers, and CAD system designers produce more complete plans to merge STEM with STEAM in a practical setting.

STEM vs. STEAM- Why it Matters

STEAM merges STEM approaches with Art to approach scientific and mathematic-based concepts from a divergent perspective (University of Central Florida, 2023). STEM focuses on the more concrete sciences, such as new concepts or progress on existing creations. The Rhode Island School of Design advocates for the education of Art in STEM due to critical thinking, decision-making, and exposure to multiple modalities through the artist's perspective (Deville, 2023). The University of Florida cited four years of art study in high school resulted in “98 points higher” than their same-age peers on the SAT assessment (Deville, 2023, p. 3). The feeling of being able to see the problem from a visual perspective can strengthen or deepen the application. The idea can be seen when items, such as a 3D printer or graphic rendering, allow interaction before addressing the living object (Deville, 2023). Affifi and Colucci-Gray (2020) cited that the integrated experience between exploration and artistic freedom of expression allows for attention of slower participation associated with sheltered exploration (Affifi & Colucci-Gray, 2020). The shift to include art in STEM comes from the desire to educate the whole child with flexibility and to encompass more diversity in learning (University of Central Florida, 2023).

The inclusion of STEAM-focused education makes students more marketable, as expressed by 57% of senior-level employers, according to the LinkedIn 2018 Report (University of Central Florida, 2023). The ability to effectively communicate, innovate, and influence are listed as the most valuable qualities that are desired in employable adults. STEAM is seen as a more collaborative and accessible avenue for soft skills still merging with complex science concepts. Soft skills most associated with females in the workplace, like teamwork, imaginative thinking, and cooperation in networking, cannot yet be managed solely by any piece of technology. “Soft skills” are growing in importance, especially as STEM education and research continue to grow (p. 1). The National Bureau of Economic Research stated the demand for work with social, soft skills, and non-automated skills will continue to grow in line with the prevalence of technology in the industry. The emphasis on helping students be more equipped to manage the need for growing challenges and professional opportunities in the STEMS career field is felt to be strengthened by the marketability possibilities of artistic ideas. Exploration into STEM connection has even begun to appear in graphic novels in the education setting, encouraging literacy development along with the terms, *skill* and *ideas* boasted by the individual fields (Romagnoli, 2017). According to the American Library Association, graphic novels are primarily a personal choice of literature at the secondary level for students (Lacoste, 2019). The books, articles, pictures, and volumes open innovative ideas for future learners willing to expand their interests (Romagnoli, 2017).

The STEM acronym has only been recognized as a term in education since the early 2000s and has only had congressional funding since 2005 (Deville, 2023). The embracing of STEM material has been incorporated in classrooms and set up in spaces in various ways, from moveable carts to hands-on exploration. Implementation of the concepts is diversified by the educator's knowledge (Widya et al., 2019), district resources, and space availability to encourage hands-on learning (Ross et al., 2020). The lack of time in development has made some educational scholars worry that the component may be too young to start adding art or other initiatives to the acronym, especially when growth in STEM rural settings is still unequal (Deville, 2023).

STEMs in Public Education

National opportunities, such as the Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science Act (COMPETES) of 2007, and the Committee on STEM Education National Science and Technology Council (2013) were formed to encourage and promote improvement in the STEMS workforce, starting at the secondary and post-secondary levels (Office of the Federal Register, National Archives and Records Administration, 2022). Due to this recognition, more than a billion dollars have been used to intervene and encourage STEM education, particularly for female students in middle and high schools (White House Office of Science and Technology Policy, 2013). In contrast, when examining the same subjects in lower grades (Kindergarten through third grade), there was a national disconnect from elementary to secondary education support, funding, and instructional time allowance (Goodner, 2021).

The 2018 National Survey of Science and Math Education trend results showed that at the elementary level, daily instructional minutes averaged “18 minutes (11%) for science, 57 minutes (35%) for math, and 89 minutes (54%) for Reading-Language Arts” (Gauthier, 2019; Goodner, 2021, p. 1). Lowering access to pre-STEM skills in elementary instruction directly correlates to the lower performance scores seen in national testing (Goodner, 2021). When comparing science scores from 2015-2019, the average science score for fourth graders decreased by two points on average. Additionally, fourth-grade science scores declined in all three testable content areas, which included Life Science, Earth, and Space Science (National Assessment of Educational Progress, 2019). These trends can be seen as recently as 2019, with Texas rating as the top ten priority educational opportunity needs in the area of math and reading scores (Showalter et al., 2019). While the field continues to grow, research has shown a decrease in students' readiness for these opportunities due to a lack of exposure or readiness in their post-secondary studies. Texas is currently ranked in the “serious” category for college readiness ranking based on the urgency of action, climbing more than ten places in priority from their previous reports.

The newest round of tools in educational STEM learning is mobile learning, which employs the use of augmented, virtual, and mixed-reality technology aimed at giving students a firsthand experience (Videla et al., 2021). Immersion learning techniques, as part of educational technology, can encourage and provide a broader range of discoveries. Videla et al. stated these programs allow students to experience adaptability, with elements of free choice and self-determined or self-directed learning focusing on student interest areas.

STEMs Employment. STEM professions and careers are increasingly broadening, with simple technical work extending to leadership and research opportunities at the highest level (Fouad et al., 2017). Opportunities, such as computer programming, graphic design, research sciences, engineering, biological research, film, and streaming education, are all examples of careers that owe part of their field to STEM education. The US Bureau of Statistics stated that 80% of jobs within the next 20 years would require at least one of the four STEM-related technical skills (Visually, 2023). Potentially, rural students could miss out on some of the highest-paying jobs due to a lack of exposure (Hughes, 2020; Thomas et al., 2018). Stakeholders, such as classroom educators, administrators, and students, could directly benefit and be influenced by the appropriate modeling and information.

Women in STEM. The underrepresentation of women in STEM fields has been a persistent issue with significant implications for advancing science and technology (Fouad et al., 2017; García & Weiss, 2017). Despite the progress made in recent years, the statistics remain alarming, and female students continue to face isolation and prejudice when pursuing math or science-centered careers (García & Weiss, 2017). The need for more representation discourages young women from considering careers in STEM. As Williams (2014) noted, the male-centric view in science and math has contributed to a gap in representation, limiting the diversity of ideas and perspectives that could be brought to STEM fields. However, the importance of having more women in these fields cannot be overstated, especially considering that women make up over half of the population (Williams, 2014).

There is a growing need for women to serve in these capacities, as the communities become more integrated and aligned with technology, enabling more diversity in ideas toward improvements (Deville, 2023; Williams, 2014). When designing new products or services, women bring a unique perspective that is often overlooked. Glimcher (2014) pointed out that the gender gap begins to open up right after high school. Early impressions of females may significantly influence their reluctance to pursue math and science (Chen & Huang, 2020).

The need for more women in STEM is further highlighted by the statistics on the number of engineering PhDs awarded to women in the United States (U.S.) (Society of Women Engineers, 2023). About 24% of Ph.D. in engineering degrees are awarded to women, and of all U.S. STEM professors, only 21.7% are women (Mehta, 2022). Pollack (2015) provided examples of early gender biases that set up many women in America not to view math as a serious study because of the discrimination they faced. These biases are not limited to possible gender prejudice but also the presentation of the materials early in school (Laux, 2021). Pollack (2013) noted many boys and girls need to learn about math and science before those subjects reveal their true potential. To address the issue, educators must make the curriculum more approachable and engaging for girls, as Mayim Bialik suggested in her 2013 interview with Forbes (Goodman, 2013; Goodner, 2021). The approach can be done by challenging the subject’s perception and highlighting the stories of successful women who have influenced these fields. Yale physicist Meg Urry emphasized the importance of preventing girls’ loss at every stage of their education due to a lack of self-esteem, misperceptions about who can enter the field of science, and inaccurate assessments of their abilities (Finkbeiner, 2022).

However, programs such as Be Wise, Science Ambassadors, and Task Force for Female Facility have made strides in encouraging young women to pursue careers in STEM (Laux, 2021; Makarova et al., 2019; Mehta, 2022). Bialick says that by making the curriculum for these subjects more approachable, we can confidently empower girls to pursue their interests and passions. “Challenging the perception gives teenage girls a place to experience the excitement of STEM subjects firsthand and engages them in stories of successful women making a difference” (Que, 2019, p. 3). Women in STEM fields are essential to ensure a diversity of ideas and perspectives that could lead to groundbreaking advancements in science and technology. To achieve this concept, educators must address gender biases in early education and make the curriculum more approachable and engaging for girls. Only then can educators empower the next generation of young women to pursue their interests and passions in STEM (Mehta, 2022).

STEM/STEAM is Looking Forward

Technology has primarily transformed the landscape of industry and education in the last 15 years, as automation is becoming more common (University of Central Florida, 2023). Healthcare finance purchasing and repetitive manual labor have shifted toward more automation, removing human components. It is estimated that 80% of projects and single tasks (food ordering, data reception, and remote tracking) could be completed by Artificial Intelligence (AI), making the skill presently nearly obsolete by 2030. The use of unconventional STEM has appeared even in areas of NASA, when they used origami to plan, design, and implement solar panels folded to save space (and weight), called the Star Shade prototype (Martin & Mphofe, 2023). The ability to unfold to protect equipment and ships from solar radiation and arrays offers an opportunity for application on potential exploration of Mars. The field continues to grow and change as information, ideas, and development advance, with personnel ready to meet the growing challenges (Marín-Marín et al., 2021). By addressing the STEM “pipeline problem,” the diversity and awareness of the need for enthusiastic learners can be addressed (Mehta, 2022, p. 3).

Literature Cross-Examination

When examining the research studies on goal setting in nonacademic settings, the studies are primarily set between 1960 and 1990, when goal-driven accountability began to catch on (Latham & Locke, 2007; Midwest Comprehensive Center, 2018). Goal setting was found to be an effective way to show progress on long- and short-term project management in the business sectors, human resources, and management. Locke’s motivational task management found those employed with more challenging and specified goals showed increased motivation to master the task to achieve the work (Locke & Latham, 2019).

Goal setting in academics became more commonplace in the late 1990s, with state standardized testing becoming more uniform across states. In Texas, accountability became increasingly connected to 2001's No Child Left Behind Act (U.S. Department of Education, 2022). Texas Educational Agency (2019) uses an A to F rating score for each district, and per the ranking, funding was distributed, withheld, or redistributed amongst the schools in the state. The addition of federal and state funding tied to these scores makes Texas progressively more accountable for students' progress, especially if they want funding (Texas Rural School Task Force, 2017). Accountability for student progress can pressure educators not to further their learning, instead focusing on the state examination as the measure of worth (Showalter et al., 2019; Texas Rural School Task Force, 2017).

When applied to an education setting, the studies revealed some educational setting ranking(A-F) benefited from positive results with multiple "ages, abilities, across academic subject areas and in varying geographic locations" depending on the readiness of those involved

(Midwest Comprehensive Center, 2018, p. 2). While goal setting has been shown to improve students' scores overall, several studies noted motivation and management as frequently mentioned drawbacks to alternative learning structures (Mahmood, 2021). Intrinsic motivation and self-management are central to driving individual goals forward in some cases (Frey & Fisher, 2022). Therefore, focusing on intrinsic motivation in large settings can be challenging because students need prompting, such as extrinsic motivation, guidance, and follow-up time, to succeed uniformly (Kilday & Ryan, 2022). The learner’s needs are considered in the outcome of the tasks and the level of performance being asked. While intrinsic motivation is suited for enjoying the task or activity, it does not always connect to the proficiency level of the task (Tolman et al., 2023). This means you can love an activity, such as dancing, and have the desire to conduct the moves (intrinsically) but not show the technical ability to improve. Only when motivation, such as a goal, is developed or idealized does the learner start to improve in the direction of alignment. Educators may also find it difficult not to compare student learners across their classrooms, especially when some students make more substantial gains than others. Students make little incremental progress or require multiple revisions to make the same score advancements (Latham, 2020). Educators can also focus on the student, as they make collective class goals, building toward collective efficacy instead of single student meetings. The modeled process shows growth can be later applied to the learner at the revision point for improved performance.

STEMS Education at Elementary

When examining the defined evidence-based practice outlined by the U.S. Department of Education (2022) on student accountability, only some of the present studies in the research field are complete and rigorous enough to align with their guidelines. The rigorous approach calls for large sample sizes, more universally applicable results for implementation, and additional levels of support for student exposure (Drescher et al., 2022; Midwest Comprehensive Center, 2018). The rigor and level of the studies are necessary to understand the approaches and solutions that apply to educational learners. The current lack of American studies at the elementary level leaves gaps in the knowledge base for educators attempting to work with students in pre-kindergarten to fifth grade (Carter, 2020).

Additionally, studies need to focus more on elementary learning to provide a rounding out of the research in SMART goals in a STEM field (Lego Education, 2023). The SMART goal method is most beneficial to learners when the goals can be broken into smaller goal completion, such as each grading period, semester, or year-end (Aghera et al., 2018). Student conferencing is one avenue for educators to keep on target, determine where the student is, and gather data toward proficiency (Latham, 2020; Locke & Latham, 2019). Based on educator and student planning sessions, educators' clarity on proficiency versus performance goals must be considered (Midwest Comprehensive Center, 2018). Without clear criteria, educators may seek a specific numerical score without considering the learning processes needed to repeat performance. Educators considering writing goals with their students must evaluate, prioritize, and address learners' motivation, as mentioned in the research case studies (Kilday & Ryan, 2022). Discussing what motivated each learner should be considered (intrinsically or extrinsically) to ensure a method of attainment is in place before starting goal writing. By using a clearly defined end goal, educators can use progress monitoring and goal snowballing to meet or exceed each incremental goal, leading to overall success (Smolucha & Smolucha, 2021).

Professional Development

There is a lack of literature on STEM professional development for general education educators trying to improve their skills. As Makerspaces and STEM/ STEAM labs continue to appear in schools, it is critical that educators need additional training and resources for complete integration into lesson planning, when considering the degree of teaching and learning necessary to be effective and passed on to students. While the words are used interchangeably when considering the audience, the terms need to be separated to evaluate the outcome desired for educators. When posing a question of exploration, educators are more likely to lean into their own strategies of learning or construction to answer underlying questions (Biesta, 2015). As educators prepare to be vendors of their education by teaching it to their students, their understanding of the topic helps attract students as knowledge consumers. With the idea of learning with a purpose as a function of the component of self-development as educators, they are more likely to hold onto the knowledge received through professional development regardless of the location.

Goal Theory Drawback

Goal theory has drawbacks that make the process of setting and refining goals with all learner types challenging and may lack motivation or require structures to see more permanent benefits (Drescher et al., 2022; Midwest Comprehensive Center, 2018). When educators focus solely on performance-based goal setting, learners may struggle more with self-esteem and individual intrinsic self-motivation (Kilday & Ryan, 2022). Some learners may not develop self-monitoring without external rewards, causing a loss of forward momentum toward their goal (Drescher et al., 2022; Midwest Comprehensive Center, 2018; U.S. Department of Education, 2022). The understanding of the motivation (intrinsic or extrinsic) can be essential to flush out in the goal-setting process. For educators who are completing training or professional development to check the box or because of required hours, motivation for learning may suffer instead of the constructive loop of knowledge (Brodie, 2019). While required training has its place in education, required training can face a more problematic buy-in if educators do not invest or feel like they would use the information (Brodie, 2019; Daly et al., 2022; Shaked & Schechter, 2017). In Drescher et al.'s (2022) research, the ability to gain more exceptional knowledge by focusing on task completion does not show a significant return due to the expectation of a reward.

In 2018, the Midwest Educational Laboratory reviewed student goal setting and reported positive student outcomes based on student contributions in the Tier 3 intervention section (Frommelt et al., 2023; Midwest Comprehensive Center, 2018). The U.S. Department of Education has delineated the strength of evidence-based interventions, strategies, and practices used in the educational setting by assigning them a rank when tiering research (U.S. Department of Education, 2022). Each level is rated from solid evidence to demonstrate rationale based on the study's results; each addresses the significance of each strategy and positive, negative, or mixed results based on progress. The top three levels of the research studies were rated strong evidence, moderate evidence, or promising evidence (Midwest Comprehensive Center, 2018; U.S. Department of Education, 2022). The designation demonstrates the studies had convincing statistical evidence and a sample size correlating with a large study (Midwest Comprehensive Center, 2018). The studies examined, when synthesizing the research, all fell in these top three tiers of the rating system. The tiering system offers a robust and reliable data source for synthesizing with educators and students.

The learner's voice and level of scaffolding to reach goal proficiency must be an essential consideration for the educators involved. Proper fulfillment of goals is necessary for each step and can help to understand how to apply these skills in their education careers. Finally, writing goals allows the goal writer to develop self-efficacy, guiding them toward independence, skill building, and goal attainability (Passmore et al., 2021). Through the course of writing the goals alongside and having an accurate model to reference, educators learn quickly. Furthermore, teaching back the system in their own classroom reinforces the goal-setting technique, leaving them with a positive or balanced feeling.

Desired Goal Outcome

When considering goal planning in the classroom, the literature supports a three-step approach, according to the National Council of Teachers of Math (Bostwick et al., 2020). Educators should spend their time building up and providing the structures while allowing productive struggle for students (City et al., 2018). Student conferencing, setting more innovative SMART goals, celebrating milestones and reflecting on the work are suggestions from the literature (Bostwick et al., 2020). The suggestions provide a basic guide for new and developing teachers with goal setting based on successful implementation in other classrooms. Each of these ideas are seen as necessary for success and supports the students' needs to reach our progress in goal setting.

The commitment to conferencing and speaking to students one-on-one sets the goal-setting tone, particularly at the elementary level, where scaffolding is necessary (Hassaram et al., 2018). For educators, being able to guard time to plan and set these goals individually or in a team helps to foster collaboration. When setting goals, the desired outcomes should be determined before moving forward in each educator's classroom (Midwest Comprehensive Center, 2018). Consideration was mentioned in six of the eight studies examined by the Midwest Comprehension Center. The study identified proficiency in goals versus performance goals, which made a notable difference in successful learning outcomes. The research supported the idea that when educators focused solely on proficiency goal setting, learners focused more on personal attainability and showed higher intrinsic motivation (Feng et al., 2023). Setting focused and attainable goals creates more innovative SMART goals for educators to model and guide students (Ertmer et al., 2018). These focused outcomes can drive the section of SMART, specifically the measurable and relevant sections (Ertmer et al., 2018; Islam et al., 2020). Learners' self-efficacy is included toward proficiency by enhancing learning and motivation instead of just outlining goals to show progress (Frey & Fisher, 2022).

The concluding section encouraged in the research body and classroom examination was celebrating and looking at refinement with learners to help motivation remain high (Feng et al., 2023). The goal-setting process is a learning process and an exercise in accountability to make incremental growth (Berkman, 2018; Locke & Latham, 2019). Even when learners do not meet their goals, the celebration is encouraged to maintain a positive learning environment and address areas of refinement to produce a growth mindset (Eun, 2019; Han & Stieha, 2020; Smolucha & Smolucha, 2021). Refinement of goal planning can increase effectiveness and levity when learners see it as part of the improvement process, instead of a shortcoming (Diefes-Dux et al., 2016).

Summarizing Literature

Integrating SMART goals into the curriculum can be a powerful tool for learners to acquire the needed planning skills and improve core subjects (Midwest Comprehensive Center, 2018). The SMART goals build on the student's foundational skills in math and science and work toward accomplishing new skills (Smolucha & Smolucha, 2021). The idea contrasts with focusing solely on increasing test scores instead of working toward growth and improving oneself.

Students learning to work on goal-oriented tasks can review their performance and examine their developmental progress either with educators or independently (Latham, 2020). Collaboration toward excellent retention of information for each student and personal knowledge should be the ultimate goal on campuses. These goals can vertically align the Texas Essential Knowledge and Skills (TEKS) with educators' responses and classroom instruction (Texas Education Code, 2022). While the exact number of disciplines of STEM and the way it should be integrated has not been prescribed, the study can be characterized by positive feedback based on early intervention with content material (Aguilera & Ortiz-Revilla, 2021). Typically, when examining the final or end-product approach to STEM integration, the student focuses on producing the most consistent successful result.

Educators are more likely to embrace the SMART goal program because they can monitor students' progress through check-in and data meetings (Weinstein, 2020). When presented to students and educators, these skills must be modeled, developed, and practiced, and they must have clear expectations (Benden & Lauermann, 2022). The skills mentioned above should be taught alongside students to gain maximal effect and progress at all targeted learning levels (Latham, 2020; Latham & Locke, 2007).

Summary

Texas' rural schools can struggle to meet state standards on math and science STAAR compared to the larger district (Wang et al., 2019). Individual skills in STEM SMART goal setting are designed to help students make progress in increments toward more significant or long-term goals (Texas Education Agency, 2017). Students would be exposed to more diversity in concepts by focusing on and integrating skills in the pre-STEM areas of math and science. The purpose of the research is to provide a tool (not presently used) to help educators improve their classroom instruction in the lowest-scoring content area of math and science based on the 2021 STAAR test scores. In an effort to meet and succeed with the *No Child Left Behind Initiative* (NCLB) of 2002 and the *Every Student Succeeds Act* (ESSA) of 2015, rural school accountability needs to improve its growth and achievement percentages each year (U.S. Department of Education, 2022). SMART Goal setting in math and science could provide the required structure and assistance to attain each milestone. Educators ensure students are taught to set realistic and attainable goals as modeled by their educators through their own integration of professional learning (Islam et al., 2020). By combining scaffolded learning and goal setting, students in rural North Texas have a chance to access the necessary skills for long-term success with both educators and students.

CHAPTER THREE: METHODS

Overview

In Chapter Three, the researcher focused on the proposed method of describing the transcendental phenomenological study of elementary educators implementing and planning STEM SMART goals in rural North Texas classrooms. As stated in the literature, educators added their voices and views to the literature research body for consideration by focusing on the success and challenges of SMART goals planning in rural settings. The three primary source approaches used to attain data were direct interviews, focus groups, and questionnaires. The three data collection sources align and refer to gathering a better understanding of these educators' lived experiences with the phenomenon in their classrooms. Each primary source offered the participant a chance to share their views and pertaining experience on the topic through verbal and written means. The third, fourth, and fifth-grade educators had the opportunity to express and share their lived experiences with implementing SMART goals in one or more pre-STEM areas. The research design and procedure are aligned to provide clear guidelines and specific content for review and replication based on the findings associated with the outcome. The methodology and research framework provide a context with the experience of those who may be most effective by the outcomes in their section of education influence.

Research Design

When considering the methodology for the research, I chose qualitative research based on the connection I felt with Creswell and Poth's (2018) description of seeing a problem and seeking to know the story behind it, requiring the depth and complexity to be described in a narrative form . The research design selected for the qualitative study is a phenomenological study used to describe the lived experience of educators with pre-STEM SMART goal planning. The phenomenological type of study is most appropriate because the tenets are used to describe the lived experience of educators experiencing the SMART goal planning phenomenon at the elementary level. Looking at lived experience in rural settings in the context has not previously been investigated, setting successfully, or at the level of education proposed by the current research frame. The proposed type of goal planning and goal-oriented achievement is specifically designed to focus on building small goals to reach larger objectives (Latham, 2020; Locke & Latham, 2019). The common shared experience for third, fourth, and fifth-grade educators is teaching math, science, or both subjects in their classroom. The aim is to describe, through interviewing, peer discussion, and surveying, how the instructional strategy affects their classroom, teaching, and student scores. By studying and discussing their own classroom, educators can speak to their natural environment, performance, and can be measured using a metric, which is typical for learning (Denzin & Lincoln, 1994)

The proposed transcendental phenomenological study was developed to bring forth the experience in a more humanized way (Moustakas, 1994; Sheehan, 2014). Through the development credited to Husserl, the research is viewed through the personal and first-hand experience of those participating in the phenomenon (Beyer, 2022). Moustakas (1994) extended the ideas through transcendentalism to focus the research on descriptive elements and experiences. The perception of reporting is seen as accurate and true, helping to give validity to the participant’s story. The perception of looking at the stories fresh and without bias helps to provide each reporting purpose as part of the whole of research (Creswell & Poth, 2018).

Individual skills in SMART goal setting are seen to help make progress in increments toward more significant or long-term goals (Latham & Locke, 1991, 2007). Educators are more likely to embrace SMART goal setting as a program because they can monitor progress through check-in and data meetings (Latham, 2020; Locke & Latham, 2019). When the educator becomes the planner, modeler, and helps the student implementer of pre-STEM SMART goal planning, the educators gain experience. Individual SMART goal planning in their content area is a new concept in the district at each specific grade level. Due to this, participants have a common shared experience of limited exposure to this specific type of planning (Creswell & Poth, 2018). Until the start of the 2023 school year, the surveying district had educators teaching math and science at the third and fourth-grade levels. At the beginning of 2022 (the last year), the participating district moved to fifth-grade educators teaching single subjects to align with the state content development standards more effectively. All educators asked to participate had taught math and science for at least one year before being asked to respond. All educators havd experienced the state standardized test (STAAR), which allows them to help guide objectives as they work through SMART goal planning. Finally, each educator had received at least one hour of SMART goal training before being asked to set goals for each content area they taught at the start of the 2022 school year. This keeps commonalities consistent with experience for all educators (Beyer, 2022).

Essential to the study for each educator was the shared common basic experience in training and content before being asked to implement goals (Berkman, 2018; Holmes, 2020). Commonality among educators helps monitor and provides discussions of progress in their classrooms (Latham & Locke, 1991, 2007). Formal short or long-term goal planning in their classroom was a district initiative in previous years; the descriptive interview should offer an inciteful and varied voice to the in-class experience in planning and implementation. The follow-through and follow-up from previous campus initiatives may vary based on administrative practice and procedures.

Research Questions

Central Research Question

What are the experiences of elementary educators in planning STEM SMART goals?

Sub-Question One

How do elementary school educators describe clarity in planning STEM SMART goals?

Sub-Question Two

How do elementary school educators describe the complexity and challenges of planning STEM SMART goals?

Sub-Question Three

How do elementary school educators describe commitment and feedback in planning STEM SMART goals?

Setting and Participants

The setting for the site was comprised of two locations: onsite at an elementary campus (Campus C) and in each educator's classroom. The spacious Makerspace classroom was an option for focus group sessions, allowing all educators to share ideas, thoughts, experiences, and views. The large classroom was equipped to accommodate 10 educator contributors. The individual educator's classroom was also used to interview individually and complete questionnaires to receive more honest and holistic thoughts without others influencing (Moustakas, 1994; Nassaji, 2020). Due to educators being more comfortable in their classrooms, questioning in their space allowed for comfort and honesty when answering more in-depth questions.

Setting

The elementary site was within the city limits of a rural agricultural community in the North Texas Panhandle. The school district was approximately 50 miles north of the closest service center for professional educator education and one of the 57 rural districts participating in Region 17 school district collaboration (Region 17 Service Center, 2023). The majority of professional learning and training for educators takes place in person at the service center to the south. The hosting district had approximately 1500 elementary students across their elementary campuses (Holland, 2022). The other districts participating resided in Region 16, serving around 300 students at their elementary level (Region 16 Service Center). The district's participating school zone serves approximately four hundred square miles of the county where they reside. The district attendance has declined in the last few years, as students have moved to more populated districts to the north and south of these communities (Holland, 2022).

The elementary school campus used for the focus group session (Campus C) was remodeled in 2022, after being reduced from six campuses down to three in-town campuses. Campus C is the three small elementary schools' largest and most centralized serving campus. The remodeled campus opened in the Fall of 2022 and contained pre-kindergarten to fourth-grade classrooms (Holland, 2022). The consolidated school serves approximately 400 hundred students. One of the critical additions includes two brand-new Makerspace for promoting STEM education. The addition is essential for exposure to areas, such as math and science, which have previously received less focus at the elementary level.

The site of focus group sessions was offered in the largest elementary (Campus C) campus to ensure comfort and space for educators. Makerspaces are large classrooms containing large windows and seating for 40-50 students. The large, well-lit classroom is inviting and often used for campus-wide meetings. Students receive instruction in the makerspace for STEM instruction as part of a pullout rotation once a week for approximately 15-45 minutes. This is a new addition to the unique rotation after finishing the makerspace classroom in 2022. Familiarity makes it a space where educators are used to talking and sharing, having previously participated together to make campus decisions.

When meeting for the focus group sessions, the second group of educators (fifth grade) was offered a chance to join the third-and fourth-grade educators at the makerspace location. However, due to teacher preference, the location of the data material, and time availability conducive to the educators, the focus group was moved to a teacher's classroom. This aided in the data conversation and allowed reflective discussion among the educators.

The remodeled fifth-grade campus has also been consolidated as of fall 2022. The campus was consolidated into a central location for all students attending the district instead of the previously spread out elementary. These pods are responsible for educating approximately 350 students on a single campus. Students and educators are grouped into pods with a four-educator rotation. The students have a choice to participate in a STEAM-related elective in addition to their daily scheduled math and science content block. While STEM-related instructors will not participate as surveying educators, the notation of additional accelerated advanced content is worth noting as a preemptive progressive move for the surveying district in the previous year.

Participants

The principal (Principal S) on-site had been in the district for many years, beginning as an educator and working her way up to become principal of the school at the end of the 2022 school year. She supported the departmentalizing of reading, math, and science for all third and math-science or reading-social studies fourth-grade educators. Each grade level had two to four educators responsible for math and science at the start of the 2022 school year. The third and fourth-grade team taught math at a rate of about 85-105 minutes daily and about 20-35 minutes of science instruction daily. The district had moved to a fifth-grade educator teaching math or science to align with the state content development standards. These educators were also departmentalized in pods of four educators, each teaching one subject for the entire period. The fifty-six daily minutes period allowed these educators to focus solely on core subjects and prepare for the rigorous state testing at the end of the year.

The educators who participated in the study were math, science, and dual math and science subject educators who taught third, fourth, or fifth-grade students. The genders of the participating educators were one male educator and nine female educators. Each educator had 15-23 students in grades third and fourth and 19-25 in the fifth-grade classrooms. Educators' classroom experience ranged from two years to 27 years of classroom experience with students.

All educators were a minimum of second-year educators in their district and had good instructional standing without an improvement plan in the process. All educators had experienced the state standard test, allowing them to help guide students as they worked through the SMART goal-planning process. Finally, the educators must have previously received goal training in order to set goals with their students in the present year. The additional training ensures continuity among the educators for recent training and implementation guidance based on district and campus expectations.

While the administration on the elementary campuses did not participate in the discussion or survey, they supported the educators pursuing the project. The focus group session was audio recorded, transcribed, and digitally transcribed for review by the researcher to assess trends, commonality, and potential refinement (Creswell & Poth, 2018; Moustakas, 1994). A peer auditor reviewed the session audio to ensure understandability and that the transcription contained limited biases by the researcher (Nassaji, 2020; Njie & Asimiran, 2014). The individual questionnaire was conducted through email to the participants who met the criteria of teaching math, science, or both at the third, fourth, or fifth-grade level and had volunteered to participate.

Researcher Positionality

My position as a researcher comes from the desire to understand and be able to articulate the feelings of educators in the North Panhandles' rural district. I conducted the research as an experienced female European-American educator in an area primarily comprised of White and Hispanic-certified faculty and staff. I am a public elementary school educator with over ten years of diverse teaching experience in the major metroplexes and rural communities across Texas. As the researcher, I have served in general and special education classrooms at the elementary level. I have taught in a rural school for the last four years at the elementary level, teaching math, science, and English language arts for grades pre-kindergarten through 6th grade. The time also covers the most recent virtual teaching that lasted over a year in the district being sampled in North Texas. As the researcher, I have leaned into these specific challenges in rural school settings due to Texas's high concentration of rural schools in the state. In Texas, almost 50% of school districts are presently classified as rural; the problem seems widespread and worthy of understanding (Texas Education Agency, 2017). I desired to learn more through the study based on the inequities in resources, professional learning, and experience as an educator based on teaching location. I recognize these experiences and resources have shaped her views, and I worked to be cautious of biases (Creswell, 2023; Moustakas, 1994). Through the use of bracketing and reflective journaling, I strived to recognize and check assumptions that might color experiences, views, or others participating in the research (Creswell, 2023). As the researcher, I reviewed these ideas, feelings, and considerations through reflective journaling. The journal helped to manage, analyze, and mitigate the personal crossing into a professional on the research topic or with participants.

Interpretive Framework

The researcher views the framework pragmatically, focusing on the real-world problem and potential solutions to these ongoing problems in the setting (Creswell, 2023; Creswell & Poth, 2018). The researcher focused on collecting and reviewing the elementary setting and analyzing the context that could affect the outcome. As outlined by Patton (2015), the research application focuses on what “works” within the context of the research (Creswell & Poth, 2018, p. 27). What works could be location, grade level, subject matter, or additional influence related or unrelated to the problem outline. The researcher continued to return to the problem of educators’ pre-STEMs SMART goal planning at the elementary level in a rural north Texas setting. The researchers’ experience with the math and science content may offer insight into the material being taught and planned (Patton, 2015). The researcher also recognized that at each content level, the expectations for learning levels increase, requiring less scaffolding and more depth of knowledge (City et al., 2018). The research reviewed the educator’s understanding of the purpose, planning, and process to understand how educators work in their classrooms (Creswell & Poth, 2018).

Philosophical Assumptions

By considering the words and views of the educators, the research is being approached through the pragmatic interpretive framework (Creswell, 2023; Creswell & Poth, 2018). The researcher understands that the participants approached the questions and experience through their own lens of truth. While the participants shared common experiences, their lenses were authentic in their specific contexts (Holmes, 2020). These lenses offered the researcher a distinctive and original contribution to the participant, even if it only helped the participant. The shared and common experiences in the triangulated data set were viewed through the lens of the research and the participant who shared them. The beliefs and constructs brought to the table by the researcher are seen as part of the shared reality. Through direct observation and sharing of ideas, the researcher was informed about the alternatives and perceptions of the participants within the study (Lincoln & Guba, 1985). Attaining an understanding of knowledge while laying aside the previous conception and while seeking to understand others is a central goal within the study (Creswell & Poth, 2018).

Ontological Assumption

The researcher's assumption is shaped by characteristics of the researcher's world views and rooted in faithful belief (Creswell & Poth, 2018). By embracing the qualitative methodology in my research, there is a belief in the singular reality of truth. While the discussion of singular or multiple realities is not a part of the research being conducted, the researcher stands firm in her faith as the basis of her truth. However, I understand that each participant may have displayed multiple realities as part of their belief system (Holmes, 2020). For each of participants, their perspective may have been seen as truth and had a right to be shared regardless of disagreement. Participants can share, express, and use their situation to conclude their daily experiences. Their experience was their own, and they shared common perspectives and experiences perceived through each of their views (Erlingsson & Brysiewicz, 2013). Viewed this way, expressing their thoughts and experiences helps others see through their lens instead of viewing from an incomplete personal perspective. The researcher also acknowledges that while all views are expressed from a position of authority in their own life, they may not be those who follow experts or authority in the field due to their experience (Patton, 2017). These statements may include conflict or disagreement in perspective due to the personal nature of the expression (Erlingsson & Brysiewicz, 2013). The expressions offered by each participant also provided the research and researcher justification for their thought aligning most personally.

Epistemological Assumption

Within the research, the assumption of proximity to the subject matter is implied and something to strive for, as the researcher seeks to understand the content material (Creswell & Poth, 2018). The knowledge being sought is based on the individual's expression and belief, just as the researcher's view is shaped by my own. How the participants share their views, allow their meaning to be conveyed verbally, physically, or in written forms of research effects the narrative they tell (Patton, 2015). In my own experience from working in the field of education for over ten years, being close to the research offers a more in-depth appreciation for the understanding being presented. The chosen expression by the participants is the way "knowledge is known" because it derives directly from the source (Creswell & Poth, 2018, p. 21). As the researcher, I clarified each type of expression with the participants during the interviews. I used the multiple expressions conveyed by the participant to verify the commonalities among the participants. These commonalities offer beginning justification for common themes or experiences in the researcher groups. Comparison of these themes to the body of research provides additional validation for the events (Aghera et al., 2018). If the body of current research does not support or is unnamed in the research, a review of the response is included to determine the validity and if there is cause for future research on the topic.

Axiological Assumption

The storytelling sought in qualitative research is one of the reasons I decided on the type of methodology for my research. I felt understanding all stories and views has value in the process regardless of which side the data is seen from, and I felt was something with which to align my research. The narrative pursued in partnership between the researcher and the participant can create a beautiful collaboration (Beyer, 2022; Leedy & Ormrod, 2013). The value of the research and research findings is critical, as research and research findings may add additional ideas and perspectives not previously considered to work. The consideration of the work environment is seen as a part of the value of the expression because it is directly tied to the experience being shared (Holmes, 2020). As a former educator, scholar, rural resident, and continuing learner, the belief in the values of shared learning is a central tenant I strive to describe and understand.

As demonstrated by the research, the participant's proximity and opportunity add to the truth the participants can express (Kilday & Ryan, 2022). Specifically, in the present research, the availability of rural challenges is well documented, but less so when considering the impact of goal research and planning on these challenges (Leonard & Watts, 2022). It is not only Texas that is challenged by rural district equity; across the nation, of the 250 counties most in need, 224 are classified as rural (Miller, 2020). The potential application could be widespread if the description of conditions is better understood in approximately 90% of the nation's rural settings.

As the state of Texas has continued to evolve, and as additional state assessments are developed, the impact only increases (Texas Educational Agency, 2019). For the educators being considered, their impact affects the area generationally. Rural setting educators are statistically more likely to remain in the towns, and they teach longer if they feel supported, heard, and compensated (Miller, 2020). The ongoing research offered educators an opportunity to fulfill being listened to in the district in which they teach. Increasing the relationship between educational research and in-field action makes support more effective and more far-reaching (Forner, 2016; Miller, 2020). As the researcher worked in a rural district, the researcher has a personal stake in improving the conditions of rural districts across Texas for equity, equality, and student outcomes. The researcher also acknowledges that, having taught both math and science may also have to work on not leaning on her classroom experience when considering shared experiences expressed by other educators. While the personal understanding provided context and background knowledge of the subject matter, citations of participants and the research body were cited to minimize bias from the researcher (Creswell & Poth, 2018).

Researcher's Role

As a researcher, I seek to convey and communicate the voices and experiences of others in the research. However, as the human instrument of the research and its findings, I understand that human error may affect the process, product, and message. As a special education instructional coach on campuses, I do not have direct or indirect authority over any educators participating in the research. My work is directly with special education educators in the inclusion or self-contained classroom across the ten schools within my assigned area. Specifically, the general education math and science educators have an acquaintance or peer relationship with me from past educational instructional arrangements within the district.

The campus where we met is one of the 10 campuses I visit throughout the year within the district. The principal, district site lead, and assistant superintendent had to approve the use of the campus for focus groups. Site permission was submitted in writing and kept for review during the Institutional Review Board (IRB) approval process. While the district approved and gave permission for use, they did not endorse the research, and all research work was to be conducted after contracted hours for the educators.

The data analysis and data collection process in the qualitative study was determined and adhered to as laid out in the procedure section to avoid biases and researcher interpretation. The compilation included the audio recording, audio transcription, coding, and themes before being compiled for analysis. The researcher and peer auditor reviewed the participants' expressions multiple times to ensure the participants' voices were heard and articulated. Once complete, the results were classified and reported within the research for review.

Procedures

The following procedure is necessary to replicate the research data collection and analysis. The data collection began with the sample of educators necessary for the data collection (Moustakas, 1994). Based on the stories needed, the research was determined to be qualitative in order to seek further understanding of the lived experience of educators in pre-STEM classrooms while they planned and implemented SMART goals (Latham, 2020). The planning and alignment aspect is vital to have in place to ensure continuity in the process.

The submission to IRB was conducted in the fall of 2023 and received before the beginning of 2024. The submission included the proposed research, the procedure outline, the participant list, cite permission, and additional research material for review (Moustakas, 1994; Nassaji, 2020; Njie & Asimiran, 2014). Upon receipt and permission, the researcher recruitment commenced based on the proposal of conditions and with reviews as necessary by the IRB committee (Moustakas, 1994). The site approval, consent forms, and additional research material were kept and attached for consideration in the appendix of the dissertation, along with the audit trail for participants based on completion dates.

Educators were recruited for the project through area size per district and region affiliation, as defined by *rural* and *north Texas*. The sample size was narrowed by the willingness to participate (Moustakas, 1994), availability during the research timeframe, math and science subjects, and grade level. In the research, I considered all math and science educators within the districts in grades third, fourth, and fifth. These educators were then further reduced by those willing to consent under the understanding they could discontinue the research at any time.

Site permission was obtained through the district before setting the site location and dates. Based on these dates, the site availability was set up for late fall of 2023 and early spring 2024 and was attached in the appendix section. The Makerspace was the location chosen on Campus C to meet with the participants for the focus group sessions. All participants were asked to attend the session to discuss the focus group questions. The focus group was initially set up after school hours, and each participant was given a name tag with their pseudonym for classification purposes within the study. Snacks and drinks were provided for the participants upon arrival. The initial focus group was relocated to one of the teacher's classrooms at the group's request due to data being more available in the classroom for their discussion. All participants agreed to the site relocation for the focus group questions.

The audio recorder was started, and participants were asked to state their pseudonyms and grade level for classification purposes within the focus and interview sections (Creswell & Guetterman, 2021). The researcher opened with preliminary questions as an icebreaker before following the outline questions for the focus group (Moustakas, 1994). All participants were offered an opportunity to speak and encouraged to share openly and without hesitation about their classroom experiences (Stahl & King, 2020). Once all questions were posed, the researcher offered a chance for participants to discuss any additional concerns (Creswell & Guetterman, 2021). Once all voices had been finished, the researcher collected related research information (Moustakas, 1994). At the completion of the focus group, the only documents related to the focus group pseudonyms were destroyed to protect the anonymity of those participating.

The researcher reviewed the audio before transcribing it based on the voices of each participant. The voice audio was also transcribed using computer voice recognition to compare the handwritten transcription and word recognition counting. Computer transcription was used to compare audio transcription accuracy. All data sections were stored on the USB and secured in a locked location while not being used by the researcher (Creswell, 2023). The USB files are password protected based on the study in order to add additional security for participation protection.

Participants kept their previous pseudonyms for the interview they were presented with within the focus group (Creswell & Guetterman, 2021). The pseudonym consistency helped the researcher to track and record each participant's trends, ideas, and contributions. Once all questions were answered, the research offered a chance to address any topics not covered by the questions for the participant to comment on or address (Creswell, 2023; Creswell & Guetterman, 2021). The researcher left the participant's classroom when all comments, concerns, and questions had been covered.

The audio files were transcribed by the researcher and saved for review upon completion of each interview using coding and theme transcription (Creswell & Guetterman, 2021). Computer transcription using voice analysis was also completed as a second source to confirm the language and word usage during each session (Moustakas, 1994). These were compared and reviewed for transcription accuracy before the final data session began. All the audio recordings, notes, and coding were the same pseudonym title per participant to ensure each section and method was completed (Creswell & Guetterman, 2021). All data sections were stored on the password-protected USB and secured in a locked location while not in use for recording or coding. Members checking for participants in the individual interviews and the focus group occurred at each research method's conclusion. This allowed the participants the ability to validate and review these two portions before entering the individual interview. As stated, corrections, comments, or amendments were annotated for understanding as necessary (Creswell, 2023; Creswell & Guetterman, 2021).

After completing all in-person individual interviews, the questionnaire was emailed to the study participants. The participants addressed sixteen questions in the questionnaire. Upon entering the final question, the questionnaire was automatically returned to the researcher's email. Upon receipt of the questionnaire, the researcher compiled answers to the multiple-choice questions and copied short answers into a table for comparison across the data source (Creswell &Guetterman,2021). The multiple-choice section used color coding of responses to identify trends across the study within the questions or answers. This gave the researcher a visual representation of the participant's opinions based on the questionnaire (Moustakas, 1994). All copied short answer questions were also used to color code based on word choice or word mapping to identify if there were common themes within participant writing. These were compiled to represent the participant's views in a visual representation through word mapping, which is a visual medium of representation.

The researcher compiled and reviewed the three data sources upon completion of the final data source. All research and transcription were reviewed and color-coded by themes, word use, question coding, research questioning, and additional comparative measures (Moustakas, 1994). Once all data (paper and electronic) was collected and coded, the data was stored on the password-protected USB (Creswell, 2023). The USB was stored in a locked location, accessible only to the researcher until the research was completed. The USB will be stored in the location for an additional five years pending follow-up research completion or destroyed upon leaving the district where the research was conducted. Upon year five, if research is no longer being used, the materials (notes, transcripts, and all pertinent documents) and the USB will be destroyed (Creswell & Guetterman, 2021). If research is still being reviewed and used, participants will be informed and requested for continued review by the researcher. At this point, any permission or withdrawal will be noted and stated for research going forward due to the effect it might have on the initial and follow-up research.

Permissions

The site approval is attached for review and was provided to the IRB committee before beginning research at campus C in their Makerspace. The site and approval were obtained from the principal, district site head, and superintendent. After review, the superintendent signed off on the research in the district, location (Campus C), and physical classroom location (Makerspace). The attachment was copied and included in the appendix's original, which was submitted to the IRB committee at the beginning of Fall 2023.

All educators involved in the research were initially asked for written or verbal permission to participate. The use of their voice and corresponding written transcription was included. Educators had the option at any time to remove themselves from the research and their documents excluded from the research and destroyed. At each data point (interviews, focus groups, and questionnaires), the educators were asked if they consented to participate, allowing for exit from the research, to be precise. Research participants also had an opportunity to request to review written transcripts if they desire during the focus and interview section. The review offered clarification and transparency of their meaning for the researcher and will be noted (if changed or edited) in a corresponding color.

Recruitment Plan

The recruitment plan began with identifying the areas in the region considered rural based on the school population (Patton, 2015). After identifying the approximately 115 districts, the qualifying districts were contacted to see if they met the qualifications to participate in the study. From the list of districts, approximately 25 school districts qualified, and willing educators were contacted (Texas Education Agency, 2022). The sample pool was approximately 25 educators based on content level: third, fourth, and fifth-grade educators, and subject matter: math, science, or both. Based on initial interest, approximately 15 educators were interested in participating. These were the sample sizes for the proposed research. These participants were chosen based on being at the subject and content taught as of the start of the 2023 school year (Gall et al., 2007). The sample was a purposeful sampling of third, fourth, and fifth-grade educators because of the criteria of education level they teach and content-specific subject matter (Leedy & Ormrod, 2013). From the number of responses, those willing to participate in the topic of study, and were available to engage in discussion based on the topic, were asked to participate.

Data Collection Plan

The data collection centered on describing the problem of SMART Goal planning in STEM areas in Rural North Texas at the elementary level. The three data collection methods were interviews, focus groups, and online questionnaires. Each of these data collection methods was chosen to allow the educators to share and contribute their stories to the central idea of the research question (Moustakas, 1994). Their voices better inform the research response by describing the concern using a sample of educators with this lived experience.

Individual Interviews Data Collection Approach

The individual interview occurred face-to-face or over TEAMS in the educator's elementary school classroom as the first source of data collection. At least ten educators were required to participate in order to reach saturation of specific ideas and themes as suggested by the research (Creswell & Poth, 2018). To give the educators comfort and privacy, the educator chose one of three interview times in their classroom. The open-ended format for questioning allowed them to speak about their experiences and opinions and share the success or failure of the topic based on their own experience in the field (Stahl & King, 2020). Due to the educators' scheduling and obligations, the questions were presented through email before the interview. Several educators requested this accommodation to feel more comfortable and settled with their ability to answer (Creswell & Poth, 2018). Since it was a comfort for some, the preview was extended to all to remain consistent.

Phrasing questions for more personal attention allowed for a more articulated expression in the 1:1 setting, creating more perceived understanding (Creswell & Poth, 2018). The interview was conducted in the educator's classroom, allowing for specific topics based on years of experience in the content (Stewart, 2009). The personal data was gathered with the initial few questions to become familiar before building to the more complex and subject-specific material (Texas Education Code, 2022). The educator was asked a rapport-building question to encourage comfort and primary classification similar to those used in the focus group. Educators had the option to review questions before the interview to formulate their thoughts and responses.

The reviewing of questions is a comfort for some educators who expressed concern about needing time to articulate their responses before being recorded. The interview was audio recorded to allow for review and transcription to be typed. The interview occurred before school, after school, or during the educator's conference period. Setting the time out of school hours allowed for more educators to be able to participate fully. The educator was able to offer additional thoughts and share experiences not explicitly asked about at the end of the interview to ensure they felt all topics had been addressed (Creswell & Poth, 2018).

Initial Questions

1. Tell me a little about the students you teach.
2. What are your favorite things about teaching(subject)at the (grade) level?
3. What is the biggest challenge about teaching (subject) at the (grade) level?
4. What makes teaching in a rural setting different from teaching in a suburban/urban setting?
5. How do you teach students to use and reach milestones in their classroom? SQ2
6. How do your prior teaching experience and beliefs with SMART goals influence your planning in your teaching practice? SQ1
7. How does improving your knowledge of SMART goal planning & implementation influence your teaching? SQ1
8. How can educators assess the quality and effectiveness of SMART goal planning in the classroom? SQ3
9. What successes have you seen in integrating SMART goals into your teaching practices or classroom? CR1

10. How do you, as educators, improve learning outcomes and instruction through SMART goals in the large group setting? Small group? One-on-one? SQ3
11. How do you redefine a SMART Goal when not meeting the goal? SQ3
12. How do you change/tailor goals to meet your student's learning needs in __ grade? SQ3
13. How do you change/tailor goals to meet the state standards for expected learning in __ grade? SQ4
14. What resources are available to further your teaching progression in your district? CR1
15. What resources are unavailable to further your teaching progression in your district? CR1
16. What else would you like to contribute to this study? CR1

Individual Interview Data Analysis Plan

The data review and analysis began with a review of the audio recording and written transcription of the interviews. The themes, phrases, and opinions expressed by the participants were coded by the researcher (Creswell & Guetterman, 2021). The researcher reviewed and coded themes, experiences, and statements that differed from the focus group or divergent from others as a point of initial comparison. The systems of color coding used in the focus group remained the same across similar ideas, with additional colors added for new or discovered themes when they emerged. Through the hand coding of the interview, the notation of divergent or convergent themes was reviewed to identify if other commonalities not initially coded emerged. The coding brought additional information that may have yet to be considered based on individuals' lived experiences. Both similarities and differences were documented and discussed, as both points of view are valid and should be viewed based on educators' perspectives (Stahl & King, 2020).

Focus Groups Data Collection Approach

The focus groups were planned in the makerspace as discussed in the setting and participation report at Campus C (Creswell & Poth, 2018). One focus group was scheduled based on the number of participants, allowing for more group discussion and dynamics with the smaller number of participants (Gall et al., 2007). The practice ensured the achievement of voices, perspectives, and solid data collection (Moustakas, 1994). The focus group took the shared experience and broke apart the components, structure, and lived experience to gather deeper insights. The open discussion was of their lived experience with STEMs, SMART Goals, implementation, challenges, or successes due to the rural setting (Latham, 2020; Wang et al., 2019). Based on the lived experience, follow-up focus groups specific to the content area (math or science) were planned but were not attainable due to the educator's time constraints and lack of attendance. Sharing common topics and trends vertically allows for greater clarity and vision on improvement and refinement (Moustakas, 1994). The educators addressed the topic of the program's growth and evolution based on opinions and suggestions being considered. . The details of each part of the focus group were reviewed through audio recording and written transcription. The transcription offered common themes, brainstorms, topic ideas, or concerns, allowing for more vertical collaboration among the educators. The initial step was seen as crucial for educators to express ideas and personal points of view before continuing to the individual and writing section of the research (Creswell & Poth, 2018). The confidence in being heard without judgment for their expression empowers and emboldens these educators through the process (Gall et al., 2007).

Focus Group Questions

1. How is your year going in teaching (insert) grade?
2. What strategies do you, as an educator, currently use to enhance student learning? CR1

3. What is your experience with goal setting at the classroom level? Professional level? CR1
4. How do you feel implementing SMART goals is going in your classroom? SQ1
5. What is the perceived benefit of using SMART goals in your (Math/Science/both) classroom? SQ3
6. What challenges do educators face when integrating SMART goals into instruction, and how do they overcome these challenges? SQ3
7. What teaching strategies do you use to refine and improve the implementation of SMART goals in your classroom? SQ3
8. How long have you taught in a rural setting? SQ2
9. What other teaching experience have you had? CR1
10. To what effect does the rural setting have on SMART goal planning and implementation? CR1

Focus Group Data Analysis Plan

The researcher examined the audio transcripts of the data recording for themes, reoccurring points, opinions, and emerging patterns based on participants' verbal expressions. These audio files were transcribed into written form before the analysis began. Any additional annotated or written transcripts were reviewed to verify consistency between data collection methods. The researcher felt that writing in a narrative form made the initial coding more succinct.

The researcher initially started coding with key frequently used words. Reviewing common phrases or themes within the transcript was the initial start to developing categories, themes, and working opinions based on educators' responses (Stahl & King, 2020). The researcher became acquainted intimately with the data by reviewing the audio and coding numerous times. The transcripts were compared to the overarching question and sub-question as one source of analysis and consideration of coding themes. A color-coding system was used while hand-coding, allowing themes to be multi-colored. For example, student learning might be red for goals, green for the desired outcome, or both if both were being stated. A peer auditor reviewed the codes and transcripts to ensure understanding and biases were not a factor in any of the themes. The phenomenological approach allowed the researcher to focus on the lived and ongoing common experiences. This methodology allowed the researcher to identify and focus on what the participants viewed as meaningful and worthy (Gall et al., 2007; Patton, 2015, 2017).

Questionnaires Data Collection Approach

The questionnaire culminates the educator's lived experience with 10-20 questions, including their perspective-based rankings of challenges and successes, including open-ended responses (Latham, 2020). Responses included content, educational level, opinion, importance, and district curriculum (Creswell & Poth, 2018; Texas Educational Agency, 2019). Each questionnaire took about 30 minutes and contained multiple-choice and open-ended questions for the educators to type responses. The data collection point was an email questionnaire to educators, with responses being recorded and returned for documentation purposes. There was the potential of additional follow-up questions about state mandatory testing, success rate, and preparedness based on personal experience. The follow-up questions were compared and ranked to discover if there may have been a correlation between the two events. Educators' rankings were examined for correlation between the individual level of education taught, along with single or dual subjects. The data collected was analyzed, correlated, and reviewed for educators' responses. The online questionnaire was distributed through email, offering convenience for educators within each time frame. All data collected through the online portion was reviewed once and then again when all questionnaires were returned.

Questionnaire Questions

1. What was your most tremendous success in your classroom this year? SQ1
2. What was your greatest challenge in your classroom this year? SQ1
3. What led you to start learning about SMART goals? SQ1
4. How do educators' perspectives of SMART goal effectiveness influence their planning and implementation in the classroom? SQ2
5. What are the challenges of using SMART goals in your (Math/Science/both) classroom? (Only educators teaching both subjects) SQ 2
6. What are the challenges to fully integrating SMART goals in your classroom?
7. What is the benefit of teaching in a rural setting? SQ3
8. What challenges have you faced teaching in the rural setting? SQ3
9. What challenges do your students face in the rural education setting? SQ3
10. What benefits do your students face in the rural education setting? SQ3
11. How do you describe clarity in planning STEM SMART goals? SQ1
12. How do you describe a challenge in planning STEM SMART goals? SQ2
13. How do you describe the complexity of planning STEM SMART goals? SQ3
14. How do you describe commitment & feedback in planning STEM SMART goals? SQ3
15. Rank the items most prohibited to in-class implementation of SMART Goals (Professional Training, in-class time, out-of-school influences, student behavior, student performance, curriculum, state, and district testing) SQ3.

16. What additional information you would like to share about SMART Goals or implementation I did not cover that would be beneficial to consider? SQ3.

Questionnaire Data Analysis Plan

The review of the questions on the questionnaire appeared with both a ranking and short answer format. The expression added a different view of educator response and was felt to have accurately captured the educators' meanings in numerous ways. However, there was consideration in how the educator's answer gave a more holistic view of educator trends.

For example, 62.5% of educators felt state testing was moderate to highly prohibited to in-class implementation of SMART Goals, 37.5% of district testing was moderate to highly prohibited to in-class implementation of SMART Goals, 50% felt in-class time prohibited to in-class implementation of SMART Goals. This type of distinction allowed for more consideration than just the feedback of educators who felt testing was appropriate for assessing knowledge due to the addition of the secondary component. Consideration was given of state assessment based on educator's view and review compared to SMART goal proficiency planning (Creswell & Guetterman, 2021; Locke & Latham, 2019). The percentage of educator's answer choices (1-5) on question number 15 were documented for consideration and comparison correlated to individual and focus group data (Saldaña, 2016). Considering the more rounded approach, using educators' opinions offers additional views on educators' successes and challenges. The questionnaire was the final data collection with the group of educators.

Data Synthesis

The data was synthesized through correlating, transcription, coding, comparison with triangulation, and review. All data produced in written or verbal form was sorted per occurrence and organized to be reviewed for completeness by the researcher. If any areas were found incomplete, they were addressed or noted for exclusion if a participant withdrew. The recorded transcripts were hand transcribed and re-transcribed using the computer to ensure organization and accuracy. Coding focused on individual sources and then across sources. The themes, successes, challenges, similarities, and differences were reviewed within all three data collection sources. The reoccurrence of these informed the study of the importance of their points and helped the research when reviewing the themes going forward based on importance. The tabulation of these educated the significance and prominence of the lived experience of the participant's research and structured the analysis by reviewing each coded theme. Any barriers or challenges mentioned were reviewed to offer a counterpoint based on the verbal or written expression of the participants. The comparison across the sources was aided by data analysis software.

Qualitative data analysis software (QDAS) helped the researcher sort and compile information from multiple data sources (Schmider, 2020). The review helped to sort the information into more specific categories and potentially shared sections (Schrum & Summerfield, 2018). The more significant themes were organized in a table based on occurrence for consistent information delivery (Nassaji, 2020). An additional table based on participation verbal or written occurrences on the questionnaire appeared. The meaningfulness of the research was reviewed and considered (Schmider, 2020). Participants' experiences and answers may inform continuing research depending on the themes and meaningfulness of the responses. The appropriateness of the response was reviewed when considering content and expression based on the themes being examined (Patton, 2017). Finally, the researcher and the peer auditor reviewed the data. While the peer auditor assisted and helped to review along the way, the final review was achieved without bias, formatting, and replication review.

Trustworthiness

Trustworthiness can be credited to the observation and auditory accounts the researcher collects from active participants within the study (Creswell & Poth, 2018). The research receives credibility through the shared experience stated by the participant, which aligns with the phenomenon being studied (Lincoln & Guba, 1985). By considering and including portions of the interview and critical themes, support can be given to the outcomes of the research (Leedy & Ormrod, 2013). These supports also ensure the study can be replicated under similar conditions for future research benefits (Connelly, 2016). Reviewing the research belief upfront and allowing suspension of their own belief can be one way to avoid the inclusion of bias. Instead of viewing it through the researcher, the participant's perspective data is used to tell the unbiased story of the lived experience (Stahl & King, 2020). The coding interviews were completed manually to ensure the participant's intent was conveyed, and audio recordings were transcribed before being imported into qualitative data analysis software. The researcher used the triangulation of the three sources to establish creditability within the literature and compare them to existing literature bodies. These measures should help preserve and enhance the interview and focus group's underlying meaning as expressed by the educators throughout the research.

Credibility

As the research is conducted, the truth and perspective of those being reported must be considered (Lincoln & Guba, 1985). The description given by the participants is seen as truth viewed at face value. Through understanding each story as presented, the research development is based on the stories' details. The data collection reported by the researcher upholds the rigorous standards expected for publication and as part of the research body (Leedy & Ormrod, 2013). The multiple interviews, focus groups, and review of the spoken and written words offer clarity to the stories. These are some ways I displayed my credibility within the study. Peers on the same campus were given the opportunity to debrief and discuss the content and questions while on campus. Peers teaching the same content vertically or horizontally could debrief using a TEAM's virtual discussion to remove travel as a barrier for sharing feedback. Both peer debriefings were optional, allowing for conversation and fellowship, as well as encouraging peer growth through shared experiences. As stated in the data collection section, participants had an opportunity to review written transcripts of their contributions to the conversation. If the participant desired after the focus and interview section have concluded, they had an opportunity to meet and discuss with the researcher. The review offered clarification and transparency of their word choice and ensured they felt understood (Stahl & King, 2020). It was noted if the participants needed to revise, clarify, or change from the original transcript.

Transferability

Applying the research to other contexts establishes the transferability of the research findings (Lincoln & Guba, 1985). The purpose, position, views, results, and methods can be described and extended. By disclosing the conditions, material, types of participants, and data sources collected, the research can be applied uniformly to other or similar situations (Nassaji, 2020). When sharing the research discussed and published based on the rural school setting, a baseline is established for other districts. Insight into other similarly structured cohorts when encountering implementation struggles due to the setting is offered (Gall et al., 2007; Holmes, 2020). The transferability can also be used to extend existing findings to further research discovered in the original study or by extending central or underlying questions (Creswell & Poth, 2018). In Texas, the focus groups and participants shared commonalities across the state (Han & Stieha, 2020), including pay (Miller, 2020), educator shortage (Wexler, 2020), and professional challenges (Gereluk & Corbett, 2020). While the conditions can be created for the transfer of the research, the replication is in the hands of the replicated researcher's control (Connelly, 2016). With qualitative research being about stories and experiences, the research provides a view more toward commonalities and shared themes instead of complete replication.

Dependability

The participants lend to dependability in the research; the procedure is outlined in a step-by-step format, ensuring the research is worthy of reliance (Lincoln & Guba, 1985). The small steps allow for identifying how the study is like others' findings, and results can be reviewed. Consideration and adapting the topic offer more meaning and facilitate the conversation's depth, thus bringing forth further exploration. The sharing of voices seen during the interview and focus group section provides a more transparent and descriptive condition beyond the implementation rubrics (Leedy & Ormrod, 2013; Stahl & King, 2020). In addition, reviewing interpretation is based on finding and examining methods with the potential of minor changes in the data collection or research stage, and the assurance of rigor is present (Johnson, 2004). A peer partner reviewer offered an opportunity for discussion and analysis to ensure the research meets the review criteria (Northcentral University, 2023). The dissertation committee reviewed the qualitative research during their review to ensure the rigor and consistency met the Liberty Education standard for publication.

Confirmability

Confirmability was established through data analysis audits to examine specific steps to ensure continuity (Lincoln & Guba, 1985). Removing bias can be accomplished using direct and complete transcribing of transcripts that do not include the research interpretation of the words (Nassaji, 2020). Instead, I used the words spoken by the participants as the assumption of truth based on their experience. Peer reviewing of coding helped to balance and support the research and remain neutral in the approach and interpretation (Northcentral University, 2023). Confirming the triangulation between the multiple sources established the confirmability of the methods, which can be reviewed and audited by peer auditors. Triangulation was completed with the three sources being compared by the researcher and peer-reviewed for continuity (Lincoln & Guba, 1985; Stahl & King, 2020). The in-depth audit of methods and methodology, while delving into seeking the constructed meaning, helped to engage the data more thoughtfully. Coding and theme identification were sorted and reviewed through a data audit when completing the research before the final analysis (Patton, 2017). Rethinking content and identifying factors could aid in their removal if biases are found.

Ethical Considerations

Considering ethics in research is one of the most critical steps, especially involving human subjects, by allowing the study to be purely voluntary throughout the data collection and analysis (Lincoln & Guba, 1985; Stahl & King, 2020). The researcher reviewed the risks and benefits of the research with participants to obtain informed consent after the discussion. Cite permission at the district level was obtained from the campus to use their facilities. Each educator agreed verbally or in writing to participate in the research portion, with the ability to withdraw at any time.

The data was stored solely with the researcher for the research period of five years at maximum, based on IRB considerations on a password-accessible flash drive (Connelly, 2016). Once the transcription was complete (audio and written), it is stored in a locked safe until the research needs to be expanded or destroyed (Northcentral University, 2023). Password-protected drives and safe-locked documentation ensured that information was not revealed, shared, or distributed except within the dissertation context as it applies to the project. Upon leaving the rural district associated with the research, the information, including transcripts and audio files, will be destroyed, along with any identifying research not previously put under a pseudonym.

Risks and benefits were kept minimal, with data requiring multiple safeguards through strict procedures pertaining to use and storage (Northcentral University, 2023). Risks for the staff involved were shared, and agreement to the research was reviewed before data collection began (Nassaji, 2020). The educator engaged in the study could face disagreement in policy, perspective, and negative peer interactions from voicing their opinion openly in the focus group. While all participants were given labels to protect identification in print, in-person interactions in the focus group were a consideration within the context. After the focus group, all sessions were a solo endeavor to prevent undue influence and remove as much interaction (positive or negative) as possible. Precautions to avoid stigmatization, repercussions, and negative attention were taken to the appropriate extent based on the research.

Summary

The chapter focused on the three data collection methods conducted on the topic of educators' lived experiences regarding pre-STEMs SMART goals planning and implementation. Through focusing on the success and challenges of SMART goals, educators in the Texas Panhandles' voices and views were being considered in the research body. Through the interview, focus group, and questionnaire, educators were able to communicate in written and verbal voice toward a solution. Ethical considerations, assurance of trustworthiness, and collection methods were discussed to ensure data reliability and replication are possible for future research. All discussions of procedure, protocols, setting, storage, and safety for participants were also considered. The third, fourth, and fifth-grade educators sharing lived experiences also offered a communal consideration of educators’ training and professional growth. Based on potential needs assessment and shared information, the review could help examine and perfect our practices as educators, offering the opportunity to change the situation to benefit our students (Urhahne & Wijnia, 2021). The primary goal of chapter four is to review the study results, consider educators' expressions, and discuss the method outlined in chapter three.

CHAPTER FOUR: FINDINGS

Overview

The purpose of Chapter Four is to present the results of the findings and review the data collected in the transcendental phenomenological study to describe the lived experience of educators setting pre-STEMs SMART goals and implementation at the elementary classroom level in rural north Texas districts. The additional purpose of the chapter is to briefly inform, discuss, and address the themes collected from the educator participant data. The researcher discusses the participants, data sources, and common themes based on the educators' shared experiences. The description of the participant's experience aids in a more complete understanding of the educator's experience in the classroom setting. The 10 participants contributed to the research base through verbal and written expressions during the focus group, individual interviews, and online questionnaires. The educators presented in Table 1 are based on subject matter and grade level; this allowed context for educators' placement without making them identifiable. In Chapter Four, the researcher presents the data collection, visual research, and research questions through the study's conduction portion.

Participants

The research participants were a group of third, fourth, and fifth-grade educators who taught in the core content areas of math, science, or both concepts. The study participants consisted of self-identified ethnicity, 60% Caucasian and 40% Hispanic; the staff ethnicity makeup contrasted with the high concentration of Hispanic and African American students from early childhood to 12th grade in the participating rural districts. Despite not affecting the research, one male and nine female educators participated, based on the participants' responses and completion of the data collection. Three third-grade educators, four fourth-grade educators, and three fifth-grade educators participated in the research to completion. One of the participants taught both fourth and fifth-grade math. Of the ten participants, five educators were instructing in math and four in science. One educator instructed in both core subjects. The educators represent five different campuses, and two of the 54 school districts in the Texas panhandle are served by Region 16 and 17 service centers.

The educators who participated were monolingual or bilingual in speech; all educators participating were in a monolingual math and science classroom. Due to the high population of Spanish-speaking and encouraged dual language programs in one of the school districts, language was a consideration for the researcher when looking into the planning and execution of the research. However, three of the 10 educators were grouped in the emergent bilingual pod, meaning some students use dual languages in speech and writing. The research was conducted in English, as it is the common language for participants, but additional consideration was put into communicating and actively considering the expression needs of all participants. With the high importance of open and active communication through data sources, the commitment to genuine language expression is prioritized. The researcher also ensured access to all questions in the educator's preferred language at the onset of the research to ensure comfort and familiarity with the wording prior to reading the recording.

The pseudonyms used were assigned to the participants from the onset of the research, with each participant receiving a numerical pseudonym. The numerical pseudonyms served for purposes of classification for the three data sources but also to ensure anonymity when reporting on the research. A commitment to maintaining confidentiality was necessary for personal details, locations, and district identification. The numerical system of pseudonyms helped protect educators from biases based on culture, race, or other factors, allowing for more detailed responses. The numerical assignments allowed educators to express appreciation and concern about their home districts without concern of the information being identifiable to them. The participants felt they could speak openly and without repercussions, particularly if they disagreed or felt contrary to a district initiative.

Table 1

Participant Demographic Information

Educator Participants	Content Area	Grade Level
1	Math	fourth & fifth
4	Math	fourth
5	Math	third
6	Science	fourth
11	Math	third
12	Science	fifth
13	Science	fifth
14	Science	fifth
17	Math & Science	third
20	Math	fourth

The data was gathered and recorded for the focus group, individual interviews, and questionnaires by the researcher through in-person and online means during the Fall and Spring of the 2023-2024 school year.

Participant 1

Participant 1 was a fourth and fifth-grade math teacher who taught in a classroom located in Region 16. The participant worked in a rural school where she was the sole math teacher for grades four through six. She said, “The students I teach are primarily from our Title One background. I have probably got at least 35% of them with a label of some sort (EB, Sped, 504, GT). I think I have a pretty wide variety in both classes because I have two levels.”

Participant 4

Participant 4 was a fourth-grade math educator at one of the elementary schools located in Region 17. The participant had four rotations of students and was the sole math teacher at her level on her campus. The participant described her classroom, “I teach primarily from our Title One background. I have got probably at least 35% of them with a label of some sort, um, with more that are being RTI, so that could be EB or SPED or 504.”

Participant 5

Participant 5 was a third-grade math teacher on an elementary campus in Region 17. The participant had three rotations of students and was one of two math teachers at the level on the campus. The participant described her class, "So I have a good variety. I would say. I have some GTs who definitely act like GTS all the way down. I do not have any EB’s, however. I think I have like a pretty wide variety in the classes.”

Participant 6

Participant 6 was a fourth-grade science educator at one of the elementary schools located in Region 17. The participant had four rotations of students and was the sole science teacher at this level on campus. The participant was located in the Emergent Bilingual section; the educator had a population of EB, ESL, or Language learners that the participant educated. The participant described the classroom, “We have a diverse- well, I say a diverse- we have EB students, we have Sped students, we have GT students. We have 96 wonderful different individual kids that I love so much.”

Participant 11

Participant 11 was a third-grade math educator at one of the elementary schools located in Region 17. The participant had four rotations of students and was the sole math teacher at this level on the campus. The participant described her class, “My homeroom is on the higher side. I have class full of EB, the class is a little bit lower; I have one class with mostly sped students and one class with behavioral issues which can interfere with learning."

Participant 12

Participant 12 was a fifth-grade science educator at the fifth-grade campus in Region 17. The participant had four student rotations and worked on a team with four other science educators on campus. The participant was located in the Emergent Bilingual section; the educator had a population of EB, ESL, or Language learners that the participant educated. The participant said this about the student in his classes: "I love relationship building a whole lot. These fifth graders are very quick to, um, very quick to love and very quick to like and care about you. I am an EB pod, so I have been using a lot of, like, um, language strategies that I did not use last year."

Participant 13

Participant 13 was a fifth-grade science educator at the fifth-grade campus in Region 17. The participant had four student rotations and worked on a team with four other science educators on campus. The participant said this about the classroom, "the reading level of this group of fifth graders, I feel, is a lot lower than last year; over 50% of our kids are in house bill 1416. Many struggle even to be able to comprehend at grade level."

Participant 14

Participant 14 was a fifth-grade science educator at the fifth-grade campus in Region 17. The participant had four student rotations and worked on a team with four other science educators on campus. The participant described the class,

> I feel that being in a rural setting has the advantage of knowing many families outside of the academic setting. Many of our students come from generational poverty, where

> education is often not viewed as important. The advantages an education offers are not understood or expected in some families. It is hard to get the buy-in that education is a way to offer a broader range of life experiences. We see our students in areas of the community aside from school, and this builds various aspects of relationships in and out of the classroom.

Participant 17

Participant 17 was a third-grade, self-contained math/science educator at one of the elementary schools located in Region 16. The participant had a single rotation of students and was the sole math/science teacher at this level on campus. The participant described the classroom, “The students I teach have a very wide range of interests. The students also vary in learning levels. I have one functioning around a first-grade level and one fine in a fifth-grade classroom.”

Participant 20

Participant 20 was a fourth-grade math educator at one of the elementary schools located in Region 17. The participant had five student rotations and was the sole math teacher at this level on campus. The participant was located in the Emergent Bilingual section; the educator had a population of EB, ESL, or Language learners that the participant educated. The educator described the classroom, “I have many emergent bilinguals in my classrooms. These students comprise at least 40% of the total population, so the language barrier is a factor in their education. The other 60% of my students range from GT to at-risk students.”

Results

The purpose of the research was to describe the lived experience of educators setting pre-STEM SMART goals and implementing them in the elementary classroom. The data sources helped connect the individual interviews, focus groups, and questionnaires, discovering shared themes as voiced by the educators in the classroom. The resulting chapter presents a comprehensive evaluation of the educators' contributions, encompassing the analysis of the discussion, data, and articulation.

Participants shared three significant themes: time constraints, educator feedback, and depth of knowledge. The educators shared and expressed many potential considerations and challenges to their in-the-classroom instruction in math and science. The information was systematically arranged in a table, categorized by the underlying theme, guiding principles, and responses. Subsequently, the opinions, concepts, and conversational exchanges were thoroughly examined for recurring ideas, patterns in language, and application of concepts. This organization was not initially computer-aided until the researcher reviewed the data sources multiple times. Three themes surfaced after reviewing the voice recording, transcriptions from the focus group, interviews, and online questionnaires. Ideas and commonalities arose across the 10 participant themes based on their shared content and grade-level experience. Additional commonalities expressed focused on challenges being faced across the grade level, content level, and districts. The variety of phrases, interjections, word usage, and interchangeable subject matter took time to consider. The most common themes are outlined and quoted in the Appendix using the shared and expressed ideas of the educators who are living in the classroom.

Theme 1: Lack of Time

Concerns over time were the most prominent themes that emerged from the data and with third, fourth, and fifth-grade educators. Many educators highlighted the lack of time as a significant factor in their teaching. Participant 4 shared, “Most of the time, I do not have time for one-on-one, but when I have in the past, which is the most successful, you are getting to see each child." Participant 11 shared her experience with student response related to time, "I will quickly go to them and talk about it(errors). And again, I do not have enough time to do a whole lesson with them." Six educators mentioned that the emphasis on time management could also be challenging to fit curriculum, conferencing, correction, and small grouping into the time allotted to teach the subject. Participant 4's response was felt amongst participants in the math classroom: "Unfortunately, there is not a whole lot of time to go back and correct those goals or to modify them." Instead, educators were faced with the choice of addressing at the moment and falling behind on the curriculum, moving on and addressing errors, tracking less rigidly, or addressing when the educator found the time.

In science, the lack of time took the form of balancing science time compared to other subjects and the frequency of dedicated science time. More than two science educators expressed that science is "viewed" as unimportant at the third and fourth-grade levels due to not being assessed. Participant 17 addressed this: "I think this is a challenge in third and fourth grade because science tends not to be allotted as much time during the day because it is not a specifically assessed subject." Due to this false view, science time may be relegated to the end of the day, only a certain number of days, or "if we have time," according to participants 17 and 6. Participant 6 shared how drastically state testing preparation can change the science schedule, even for a self-contained science educator.

> So, at the beginning of the year, I could do science five days in a row. We were cranking out science. I felt like the kids were able to soak in more, and we were able to get more out of it. But since we have come back from Christmas, we do math two days out of the week and science three, but on Thursdays, my groups are still getting pulled back for

> math in my room, so the students miss science… But when it comes to science now, we are not doing the hands-on stuff the kids enjoy.

This can lead to an unequal knowledge of science when the students get to fifth grade, where science is a state-tested subject. Participants 12, 13, and 14 expressed deep frustration and concern over the prospect of students falling behind in the curriculum. The idea of falling behind creates a sense of urgency to ensure that students remain on track, leading to a further reduction in the amount of time teachers have to teach each year. This trend in the participants' minds may cause concern, as it may adversely affect the quality of education students receive. Participant 14 shared, “We really work at trying to take the students to that level where they are going to need to be or the way to get them to that level.” Participant 17 stated her split math science time: “My greatest challenge is keeping students focused and on-task because of their extreme excitement during science labs wanting to know more. While wonderful, we can get off-topic, not allow us to meet the time limits set for our unit goals.”

The time issue appeared to be a typical challenge for educators in these grade levels. This was partly a surprise because the educators followed the state-suggested curriculum, which is supposed to account for learning time equally. The educators cited additional difficulties that interfered with the learning, such as reading challenges, unrealistic lesson times, and scaffolding for background knowledge. Due to time constraints, each participant mentioned concerns about accomplishing and meeting content or curriculum goals. Participant 11 stated it this way when talking about personalizing learning with the new curriculum: “I am sorry. I do not have time for that.” The participants' time factor was enlightening and concerning when compounded with other concerns, such as depth of knowledge and educator feedback.

Consistency

Educators at the third, fourth, and fifth grade levels spoke about the concerns of time connecting to the ability to track their students' goals consistently. While all 10 participants shared their conducted goal tracking with their students, nearly half of them also mentioned that the time pressures had hindered their ability to conduct goal tracking with fidelity compared to previous years. One participant shared that instead of using every unit as a data point, she had to restrict it to the two interim tests in the fall and one in the spring. Participant 17: “Students assess three times throughout the year; we wrote what the students thought they could achieve in third grade. Students made some predictions; some were right, some did so much better, some did a lot worse.” The fewer data points did not allow for the class to see the growth the class had previously seen. Another participant stated that instead of unit assessment (about once a month), she was forced to use more informal methods and exit tickets to track feedback due to the design of their new curriculum. Participant 13 shared their experience with data tracking: “Before the summative, we share about where the students want to be, what it takes for every student to perform to get to that level. I feel the kids feed off goal setting if it is a competition.” Both participants admitted it was harder to see learning trends when the units were not assessing a singular topic authentically.

Theme 2: Depth of Knowledge

The concerns over the depth of knowledge were consistent among the math educators at the elementary level in the research that spoke to math being a more attainable and concrete subject for their students than reading. The idea that math was more attainable was voiced across the three data sources as a strength for the student's depth of knowledge at the elementary level and a positive for educators' content experience. Participant 5 stated, “There are more like tangible things that you can do with math.” According to Participant 11, “Math is one of those black and white things, so you can definitely see it when the student understands it," the educator felt was helpful in student attainment. The math educator participants also cited using manipulative graphics, charts, and visuals that start early and progress as a benefit to attaining and retaining content from year to year.

In the area of science, the participants voiced equal excitement mixed with a small amount of interpretation of the student being ready and familiar with the necessary content. As Participant 14 stated, "expected to gather content in a subject that the students are, are new to many have not been exposed to even when the students are supposed to have been." Participant 1 stated her challenges in science this way, "it is looking at where the students are coming from, um, and knowing that for some of them, it is not mastery of our content. It is, um, it is simply making gains from last year to this year, wherever the students are." The subthemes that emerged from the theme of depth of knowledge included (a) language challenges, (b) reading challenges, and (c) learning inequities.

Language Challenges

Across the multiple districts, the educators brought to light that a factor in their planning and implementation was the language barrier or language consideration within the population to be educated. Each district participating had between 6.5% and 10 % of their population classified as bilingual or English language learners. Participant 20 shared, "I have a lot of emergent bilinguals in my classrooms. I would say these students make up at least 40% of who I teach. The language barrier is for sure a factor in a lot of what we do." Participant 12 expressed the focus on language often takes priority: "When I get a new unit, I look at what the main vocabulary words that we have. Like what are some words that we can use, like can translate English and Spanish?" As a science educator, participant 12 shared "I figure out, like, okay, how can I help both languages look at this word and understand it? And then I move on to the STAAR questions and go from there."

The educators faced an additional challenge at the schools with bilingual education programs, specifically those catering to English Language Learners (ELL) or English as a Second Language (ESL). The educator had to ensure students fully grasped the objectives and content before discussing the goal-setting process. Grasping the content was necessary to ensure that the students could effectively participate in the goal setting at each level. Working toward complete understanding requires more effort from educators to provide sufficient support and guidance to their students. However, it was crucial to help them succeed in their academic journey. The topic of language challenges came up during the discussion, but it was not something that only language learners faced. The science participants elaborated that students are required to acquire a completely fresh set of terminologies for each unit and subject; these are unique to the respective topics. The depth of science knowledge demands significant student effort and poses a considerable challenge to their learning experience. Participant 11 clarified that students "(content language) is something completely new, even with all the materials and unit language for them to know." This academic language was a challenge to other fringe populations, such as 504, dyslexic, special education, and students low in literacy. The acquisition of unfamiliar terms and vocabulary and lacking prior exposure created a challenge for third, fourth, and fifth-grade educators working to increase exposure before the standardized testing requirement in May.

Reading Challenges

Challenges in the area of reading were mentioned throughout nearly every element of the interview as something that hindered student progress in the classroom. As one of the most outstanding challenges educators had to overcome in grades third, fourth, and fifth, both subjects are equally affected, according to the participants. “It is challenging having students who are reading at kindergarten and second-grade level being expected to gather content in a subject that the students are new to (in the fifth grade),” according to Participant 14. All participating district educators voiced concern pertaining to learning acquisition, which was increasingly lowered without the ability to read competently, creating further challenges in the classroom. Participant 17 expressed concern when she voiced “60 to 70% of them cannot read on a fourth-grade level (in fourth grade). And so that is made it particularly challenging.” Even the fourth-grade educator, Participant 4, expressed, "When there are missing foundational years (content and skills), like in kinder, first, and second, it means that the students will have large deficits once these students get to fourth grade, which is hard to overcome.” The educators in the third and fourth grades expressed a desire to fill in the gaps in learning. However, due to the pace of the curriculum and the variety of learning levels, it is not always feasible to take learning down to back a single or multiple grade level without falling behind. Participant 20 felt that “Setting goals with students becomes challenging when the student lacks some basic skills that are needed to become successful. For example, reading comprehension is a skill they should build from grade to grade; however, many lack foundation.”

Rural Inequities

The ability to learn and teach in a rural setting was a commonly discussed topic between participants and the researcher. The educator focused on rural challenges in terms of learning inequity or community challenges. Both subthemes were affected by the location, proximity, and availability due to the rural setting. Participant 5 said, “Kids do not have as many life experiences that can correlate to their learning (in math).” Participant 4 contributed to the idea of the disparities among the students seen in the classroom. The students who are more financially stable are outperforming those who come from less affluent backgrounds. The less affluent or financially unstable may struggle to show their knowledge appropriately. This causes a challenge to balance the extremes and meet the education in the middle due to outside factors. The rural educators spoke to the place's connection with the learning challenges or values within their school. Filling in for the areas lacking in experience is easier when you can ask your neighbor (next-grade educator) due to the low staff count. Participant 4 said, "Looking at what prior years teaching and seeing where the holes and gaps are a benefit." When holes in knowledge are identified, students can receive more of a personalized experience when educators share students across grade levels and content.

However, the rural districts can face challenges in location, funds, and experience availability, as expressed by participants 13 and 14. Participant 13 said:

> Because we are so rural, less is available for us. We do not have any cool, expensive science spectrums available to see. We do not have the funds to be able to do certain things. It is not like there are just copious amounts of activities for us to connect to outside of the classroom.

Participant 14 stated this: "Our students are limited in their experiences. They are extremely limited in their experiences because of where they live. I do not think we have some of the problems even smaller have." With rural districts having to travel at least 50- 60 miles or more each way, science or math enrichment opportunities can be limited before even considering the cost. These concerns echoed the desired improvement for future teaching: "I do not have another person teaching the same grade level or subjects as myself. I cannot even go to somebody and ask; how do you teach them to multiply? Cause nobody else is doing that in my district," said

Participant 17. Instead, educators rely on vertical alignment in their district or must look outside their districts. The availability of common content educators was noted as a widespread problem in rural districts, with more than four of the ten participants being the only educators in their grade or on campus serving the subject. The importance of leaning into the community of educators may offer a more robust and centralized learning ability for those educators who find themselves teaching in rural spaces.

Theme 3: Educator Feedback

Even with the time constraints previously mentioned, all 10 participants expressed the importance of feedback with their students on goals, progress, and refinement of lessons. Participant 5 shared: “We have those discussions during those times when we write down their progress targeting TEKs in small groups.” Participant 11: “Definitely talking with them; I understand where the student went wrong and then a quick fix,” depending on the level of the problem. Participant 1 shared, “I also encourage students to help their peers. I believe if you can teach or explain it, you can do it. This helps build students' confidence levels and encourages them to speak out.” This individual and collaborative approach to feedback is supported in literature and also built for a better classroom environment according to the third and fourth-grade self-contained educators. As part of the learning cycle, the educators felt that addressing the goals and learning throughout provided students with a more holistic approach to their learning than just looking at the numerical numbers.

Eight of the ten educators also expressed the need to understand or meet students at their level as a top priority when responding to the questionnaire. Participant 5 stated, “Seeing where the students are at right now and then, um, looking ahead to where it is reasonable for them to get to by the end helped dictate my teaching.” Participant 4 shared what she did in her class: “I am looking at data from last year to get a better understanding of who my students are, um, I am able to see, um, inform those goals based on where he or she is at." Participant 11 added to this by sharing, "It helps to see the percentage of the whole class, the percentage the class got this unit module, oh, the next module, did the class go up or down from it." The educators share in the desire to provide more than just numerical values to their students, instead providing a path to pursue a deep understanding of the content material. The two subthemes that emerged from educator feedback included (a) student vs. educator tracking, (b) curriculum, and (c) local and state accountability.

Student vs. Educator Tracking

When the research began, there was a consensus from the body of literature that student-set goals were more longstanding and beneficial at all levels for student growth. The participants in the data collection portion expressed opposing opinions on this topic based on their classroom experience. The differing opinions created points of comparison in student ability, student knowledge, and educator comfort with their concept of productive struggle in their classrooms.

The third-grade educators voiced that their classrooms had seen more success with educator modeling; the participants at this level felt their students struggled with attainability, focus, and understanding the intent of SMART goal-setting components. Participant 17 expressed, "I have always set goals for myself and my class and individual students. As I mentioned before, I include the students in some of the goal setting." Participant 11 described the community the class used for progress: "The students help me with moving the learning wagon together." Participant 17 also shared, "Class goal setting is a big part of my planning process. I usually start with a big goal, like a unit goal…I change the goal for myself for that lesson and knowledge goal setting, improve my teaching" depending on how the student performed.

This differs from fourth- and fifth-grade educators who allow their learners to develop independently or be self-directed with their achievement. The difference may be partly due to their age and previous experience in data tracking, requiring a less direct approach to goal setting. Participant 14 shared, “I have used goal setting with students. I do not feel that students understand what it is to set a goal and see it through. I feel older students are more capable of realizing the value.” Participant 6 stated, “I am able to let students go off on their own and actually do what they need to do. The ones that struggle a little bit, I am able to pull them back and teach in smaller groups” about the science classroom.

Participant 12 summarized the goal-setting process at the fifth-grade level like this,

> We do set a goal, for like us to all of us, to at least approach a unit test or something. If it is achieved, I do see a lot of growth in students. Like the students are very eager to, okay, let us get to the next goal. And so, we have done that. Let us, let us what is next? You know? So, I think that success in that way is motivating them to achieve more of their goals and set more goals.

Prohibitive Curriculum

In one of the districts, participants shared that their educators were embracing a new state-approved curriculum (Pseudonym Program C), altering the way educators have previously taught and tracked student progress. “It (curriculum) is something completely new...new to all the things, unit language, teaching, and overall tracking,” stated Participant 11. The new curriculum in the district was also mentioned as being prohibited to SMART's goal of consistently tracking the year because of the time and structural elements. Participant 5 shared that she felt that “Program C this year is not in TEK alignment; the biggest challenge would be like that part of the curriculum year.” The participants shared that the grade level and campus had to adjust and deviate from the curriculum because it was not meeting what the students needed to learn. Participant 4 expressed, “Modifying a goal is one thing, but looking at a curriculum and seeing that it is not working is more impactful to a student over time because we are willing to cater to their needs and not just force our way on them in a different way.” Some participants see the rigid structure of the state-approved curriculum as contrary and do not promote the same individual student tracking as previously embraced and used by the educators. Participants shared the common desire for standard testing to mean something to the students, educators, and districts beyond just a data point. The educators felt instead that this data should be a source for better planning, growth, and student improvement. The idea of adjusting the content and material for the more nontypical learner in the other participating district is embraced by Participant 17, sharing,

> When the activity does not work at all, then I will make adjustments for future lessons for those students…if students do not achieve the goals, then I make bigger changes for next year. When nobody met the goal for the day, I knew that it was not them; that was something that I did. So, I need to change the goal for myself for that lesson and knowledge goal setting to improve my teaching.

What was alarming through the data was that multiple educators across third and fourth felt as though, as educators, they were limited in the review options when students did not understand the concept or content under specific math curricula. “In curriculum right now, we do not really have time to go back, so it is like, what is wrong? Oh, okay. Let me do a quick little mini-lesson, and then we have to move on,” according to Participant 11. The quick adjustments were expressed as a better short-term solution than falling behind or embracing reteaching when in the second semester before state testing. This was remedied on multiple elementary campuses through the use of tutors, interventionists, and other content working to improve the learning gaps.

Local and State Accountability

Each educator interviewed expressed that state testing was a present awareness throughout the school year. To prepare students to take practice STAAR, interim assessments, and the regularly scheduled assessment in math and science. Educators prepare for between one and three yearly state assessments at the third, fourth, and fifth-grade levels. Participant 1 shared her experience, “Students may show their abilities in class and freeze up during testing, hampering their ability to show what the student can do adequately. I worry state testing has forced us to move from measuring success to fear of failure.” Regardless of the content (math or science), the passion for the student was evident in the way educators talked about their classrooms and their achievements outside of standardized testing. Participant 4 took the stance, saying, “Many times, the state imposes unrealistic standards on students in my classroom. So, I refuse to allow the state standards to hold back or discourage my students because I know some of these students may never reach state-dictated level.” Participant 14 expressed concern about science based on state testing:

> The state's goals are not aligned with 10 and 11 -year-old children. When you give them a set that includes seven questions on seven SES (scientific and engineering standards) based on one phenomenon, I think you are asking an eleven-year-old to do more than kids are cognitively able to do.”

The participants expressed that the time, energy, and payoff of the raw data collected from their students was not entirely worth the effort afforded. It was noted that some districts begin state preparation as early as January, a full 60-plus days before the first assessment in April.

Participant 13 shared, “The goal is the state; the state tells us where we have to be, and we have to figure out a way to try to get there.”

Outlier Data and Findings

Outlier Finding Science Standards Fifth Grade

In the two of the data sources, participants at the fifth-grade level brought to the researcher's attention concerns specifically related to the assessment and concerns of rigor. During the focus group, the educators' team discussed that the rigor vastly differs depending on the source material (textbook, activity, and others.). Participant 12 stated, “One textbook will be much lower than a different textbook, but the students are supposed to be teaching the same content and for the same exact test.” These differences also extended to the assessment set at the campus, district, and state levels, with them not aligning, leaving the educators to try and figure out the level and question type necessary for their students to know. Participant 13 shared

> It is a little difficult right now to assess because, if you look at it with how we are making Do-Now, you go to the STAAR test and look at that same. The state may evaluate it entirely differently than the students have ever assessed it before, and the children did not have the tools to answer that question.

The participants in fifth grade felt as though, as educators, they were working on hitting a moving target with the standards, testing, and questions constantly in flux, making it difficult to know what the state feels is most important for students to acquire. Participant 14 shared, “We really work at trying to take them to that level where the students are going to need to be. It is just, again, there is a big question now is what that level gonna need to be?” As an educator, the team shared that often, students can produce more than the student is able to show at the moment on one day of testing. Participant 1 offered her insight toward her fifth graders, “Verbal and written testing, but most of all listening. Students often speak out during class, so you can get much information on what the students know and do not know then." While not all participants shared the topic challenges in the fifth-grade standards, the ideas were worth considering for the research since the concerns were specifically mentioned vertically across the fifth-grade level participants.

Research Question Responses

The purpose of the collection of this qualitative research was to describe the lived experience of educators setting pre-STEMs SMART goals and implementation at the elementary classroom level in rural north Texas districts. The research and the central and sub-questions were shaped by the responses of the math, science, or both content educators. The educators shared honest, raw, and, at times, controversial expressions about their successes and struggles in the classroom. The accounts through individual interviews, focus groups, and questionnaires provide context and insight into the pre-STEM content at the elementary level. The response to the central and sub-questions helps to provide further details and an explanation of the questions below.

Central Research Question

What are the experiences of elementary educators in planning STEM SMART goals?

The central question provided an entry to understanding educators' planning and reflective experience with the STEMs and SMART goal process. The educators expressed a desire to work with students across all three grade levels and see growth in the students' math and science academic studies. All participants shared, in their own words, a common desire to be a part of a system that moved or propelled them toward meaningful and purposeful learning at their grade level and beyond. Participant 17 phrased it, "An educator who sees SMART goals as effective, relevant, and helpful to their students will implement them and use them in their planning process." Suppose the educator sees SMART goals planning and implementation as just another thing the educator is required to do. In that case, they will not fully implement them in the classroom, thus limiting their effectiveness. The planning needs to be intentional and purposeful when considering STEM and SMART goals in their classroom. Participant 12 asserted, "When you are able to understand what a SMART goal is and able to set one, then I believe that you are able to guide your teaching and students' learning into meeting the goal that is set in place." The modeled process is especially necessary in the younger grades, requiring early guidance to remain on track. Participant 11 added a focus on the student, "It helps me as an educator see where each individual student is at, and it helps me know what we need to work on with that student." Based on the five tenets of Locke's goal-setting theory, the three sub-questions were developed to determine what part of the tenets educators best identified for success in the math and science classroom.

Sub Question One

How do elementary school educators describe clarity in planning STEM SMART goals?

Clarity is the first tenet of goal setting, and the participants offered suggestions and connections to their content. Having clear goals is essential for achieving greater output and better performance. When goals are measurable, it becomes easier to track progress and identify areas for improvement. The educators spoke about clarity in descriptive terms and identifiable terms connecting STEMs and SMART. Participants 11, 12, and 13 spoke about the necessity of a solid foundation for future success beyond secondary academics. Participant 20 phrased clarity in the classroom as "specific and straight to the point," allowing knowledge to become action. Setting clear goals and establishing a deadline for completion helps prevent misunderstandings and ensures everyone is on the same page. The process also enables individuals and teams to focus efforts and allocate resources effectively, leading to more successful outcomes. Participant 14 spoke to clarity in specifics of goals, “Goals are worded so that the path to achieving the goal is clear. Activities and learning opportunities align with the STEM SMART goal.” The knowledge led to the students knowing and producing more success in the classroom. The participant shared that understanding the end helps to work backward based on their timeframe. Older students are more able to internalize this process on their own, whereas younger students may require guidance to understand the long-term process and planning effects.

Sub Question Two

How do elementary school educators describe the complexity and challenges of planning STEM SMART goals?

Challenge and complexity offer an opportunity for understanding Locke’s goal-setting structure. With the educators, complexity and challenge were integrated with planning and student success. Challenges can be a powerful motivator for individuals, providing a sense of pride and accomplishment when overcome. Participant 20 described complexity and challenge and shared, “Defining what you want to be successful in. No broad terms, the measurability of the goals and what is an appropriate way to measure.” The feeling of triumph that comes with accomplishing a challenging goal can be a powerful driver for individuals to set and achieve even more challenging goals in the future.

Complexity in planning was seen as helping to ensure that students were presented with appropriate options for differentiation. When students participate in setting a goal, the student is more likely to feel invested in its success and to be motivated to work towards its achievement, Participant 14 asserted. "Guiding goal planning while keeping in mind the activities and opportunities that will be accessible for students." These goals should be challenging to encourage growth and academically appropriate for the student's abilities, but not so difficult that achieving and assessing is frustrating. Each new goal extends the opportunity for growth but is not so far-reaching that it is unattainable. This sense of ownership and shared commitment can help foster a sense of teamwork and collaboration, which can be critical for achieving a challenging goal.

Sub Question Three

How do elementary school educators describe commitment and feedback in planning STEM SMART goals?

Commitment and feedback are the final steps in Locke's goal-setting outline. According to the educator, commitment and feedback are central to teachers in education. Through the use of time setting and interpersonal dialog with students for successful learning, teachers live out these values in their classrooms. Participant 1 phrased it as "sticking to the plan and following up with student personally, which is hard with the current time constraints of time." Feedback is a crucial tool that helps individuals evaluate their goals and determine whether or not the goal has been achieved effectively. By providing feedback, individuals can assess their progress toward their objectives and make necessary adjustments if the individual feels they are not making sufficient progress. The educators also mentioned the necessary use of reflective practices in their planning to meet their students' needs better. Participant 17 added, "I describe commitment and feedback by reflecting upon the goals, evaluating their effectiveness, and redefining when necessary. I set clear expectations for meeting goals. When students fail, I work with those students until they can achieve their individual goals."

The reflective practice mentioned was seen at each level and echoed when teachers found errors in student understanding. This process helps to prevent the loss of interest and motivation that can occur when the expectations of a goal are unreasonable, allowing individuals to stay focused and motivated toward achieving their objectives. By regularly seeking feedback, students can ensure that their goals remain relevant and achievable, helping them to remain on track and achieve success in all areas of their education. If and when there are errors in knowledge, first address, reteach or integrate, and correct them with the educator to ensure that growth in the content can continue without the creation of deeper pieces of information.

Summary

Chapter Four is an overview of the participants and the research to describe the lived experience of educators setting pre-STEMs SMART goals and implementation in the elementary classroom. The research used transcendental phenomenological design through interviews, focus groups, and questionnaires to better understand the experience of the 10 participants. Through a rigorous process of analyzing the transcripts and carefully reviewing the data, a systematic approach was taken to identify reoccurring themes and subthemes that were pertinent to the research; analyzing was completed by closely examining the word use and content of the transcripts, allowing for a more detailed and comprehensive understanding of the data. By carefully identifying the relevant and reiterated aspects of the data, the themes and subthemes were developed to accurately capture the essence of the research. The resulting analysis provided a rich and nuanced perspective on the data, revealing insights that would have otherwise been difficult to discern. The themes identified were time, depth of knowledge, and educator feedback. The narrative nature of the data sources produced detail and honesty to the experience that reflects the intent and effortful work being pursued in the classroom.

The data collected was centered around the central research question and three sub-questions. Educators were posed with topics ranging from classroom experience to challenges in rural settings and centered around potential improvement for their students' experience. Educators spoke about the challenges encountered through state testing and the lack of student understanding and preparedness with the material. The science and math portions were also not held equally when it came to teaching importance in non-tested grades, making the allowance per subject unequal or revisable when test preparation started. The importance of feedback was also spoken about in great detail. Younger grades embrace more one-on-one style, while upper grades tend toward classroom or large group feedback. Both were spoken as an avenue for student and educator improvement using as a reflective practice. Overall, the educators participating spoke of their appreciation for having their voices heard and considered in the hopes of making improvements for their students in the coming years.

CHAPTER FIVE: CONCLUSION

Overview

The purpose of the transcendental phenomenological study was to describe the lived experience of third, fourth, and fifth-grade educators setting STEM SMART goals and implementation at the elementary classroom level in rural north Texas districts. In chapter five, the researcher sought to examine and describe the narrative findings from educators and the data sources. The 10 educator participants expressed their experience through individual interviews, focus groups, and online questionnaires. With the considerations voiced by the participants, the chapter focuses on the implications for practice, policy, limitations, methodology, and future research resulting from the examination, including specific findings related to individual educators and some factors at the district or state level. Implications embraced at each level may offer the opportunity to encourage continued math and science growth at the elementary content level. All considerations may contribute to the continuing building and improving the environment for STEM education to grow in the rural school setting.

Discussion

From the outside, the modern education system is seen as the balance between educators, students, and the state education agency. The balance can feel less equal for the educators and stakeholders working within the system. These inequalities were discussed and described in the research data and the narrative from the participants. Educators voiced strong opinions on student education, content knowledge, and the effect of time on the quality of the educational experience. Participant opinions were considered, and many aligned with present trends in the research field, providing merit to the necessity for applicable solutions for strengthening student and educator learning. The chapter will examine the topics and themes brought forth from the research due to repetition to continue the discussion on educational growth. The discussion will address as they relate to SMART goal planning and educators: (a) Discussion of Findings; (b) Implications for Policy or Practice; (c) Theoretical and Empirical Implications; (d) Limitations and Delimitations; and (e) Recommendations for Future Research.

Summary of Thematic Finding

The thematic findings most relevant to the research expressed by the participants were: educators felt they lacked time to address content subjects appropriately, educators felt foundational science knowledge was weak, and educators expressed a struggle to align to state expectations. The expressions of concern were seen as directly reflected in their students' progress, knowledge, and skill acquisition going into the following grade level. Educators also expressed that these prohibitive factors may lead to less equipped students, lack of further instruction on the content, or gaps not being addressed with students.

The central research question the study attempted to address was: What are the experiences of elementary educators in planning STEM SMART goals*?* This question sought to describe the lived experience within the classroom for educators in the areas of math and science. The ten participants provided written and verbal expressions of the successes and challenges related to their experience. Participants spoke to the challenge of time constraints, consistency in goal tracking, and outside influences, making planning with fidelity difficult. Participants also shared that when they were able to plan, they saw growth and success in their student's learning and their own lesson progression. It was noted in the research that the educators who had had previous years of success with SMART were more inclined to make the time to commit to check-ins and student growth tracking, even when it caused a compromise in other content planning. Additionally, while not surprising, participants commonly shared that the planning was more achievable than the implementation or execution in the classroom. The intention was well-meaning, with goal tracking every unit or every six or nine weeks; however, achievability was more elusive for educators in their own practice.

Research sub-question 1 addressed the question: How do elementary school educators describe clarity in planning STEM SMART goals? The educators spoke about clarity in their planning as objective and well-defined to help align to the specific timetable. At the planning stages, the participants felt the need to explore the strategies of backward planning and define the timeline. This was seen as helpful when facilitating their own progress and that of their students. Clarity was spoken about as a crucial component in concentrating the efforts through the use of milestones aimed at the successful completion and outcome of growth for their students.

Research sub-question 2 addressed the question: How do elementary school educators describe the complexity and challenges of planning STEM SMART goals? The participants expressed their commitment to challenge and provide complexity in their own planning but also in the approach they encouraged with their students. Specifically, concerning the new curriculum or subject they instructed, understanding the challenges and complexity was voiced to be necessary. The combination of both elements (complexity and challenges) appeared natural as student requirements became greater and was seen as a source of growth. The fifth-grade educators specifically saw success when challenging students, prompting more growth as students embraced the challenge. The ability of the participant to encourage the student to overcome challenges was felt to be a motivator, allowing them to be instilled with accomplishment and power individually and as a class. Due to the student helping to set and track the goals, students placed value on their accomplishments and felt vested in math and science. The chance to set attainable, collaborative goals encourages collaboration and progress monitoring in future ventures when they face similar challenges.

Research sub-question 3 addressed the question: How do elementary school educators describe commitment and feedback in planning STEM SMART goals? The participant’s shared feedback was the second most crucial element in their classroom, next only to actually setting forth the goal. The dialog between student and teacher or student-to-student allows them to receive guidance and encouragement. Regardless of whether the student’s achievements are met, the ability to express and formulate their learning in works ensures improved learning, according to the participants. The necessary revisions, refinements, and adjustments come only when they can see the goals as a whole instead of individual parts, often requiring a second opinion. According to the upper-grade participants, this reflective practice modeled by the educator can be transferred as the student progresses. While the time (commitment) section was mentioned as a more challenging task to accomplish, those educators who regularly practiced saw greater educational returns.

Critical Discussion of Finding

The educators involved in the research were diverse, allowing participants to compare and contrast the elements of the education they provide. The educator's honest feedback was positive and provided a reflective aspect for both the educators and the researcher. The researcher uses the research body, the educators' diversity in experience, and the content's lived experience when considering the findings. The presented findings address the themes, word usage, and meaning portrayed by the participants serving in rural districts in North Texas schools. The reflective nature of the work was embraced and reviewed, which led to a discussion about improvement of the content, curriculum, and identification of the steps necessary for growth in the year to come in these rural districts. Additional consideration of the alignment to present data in the research body provided context for growth measures specific to Texas educators, rural districts, and necessary adaptations for student success.

While the research body spoke of more of a need for professional learning for rural educators (Cromartie, 2020; Mahmood, 2021), this was not the sentiment expressed by the participant in the study who felt supported by their ability to reach out to the service center and district capabilities in training. This was a positive for the educators who across all campuses felt they did not lack opportunities even though they were more rural in district location (Miller, 2020). The educators instead expressed more need for access to experience and access for student learning than their own furthering education. The educators seemed to share that many students needed a richer variety of exposure outside of the rural setting, which was prohibitory due to the distance and cost associated (Showalter et al., 2019; Weinstein, 2020). The idea of diversity in based knowledge also was present when the educators considered the foundational knowledge may be coming into the core subject.

Along with the potential to connect to others, the ability to collaborate if they were the sole math or science teacher in the district due to the size would influence the outcome these educators experienced. The connection to PLC in the literature provided a potential opportunity for educators and stakeholders to be expanded to meet collaborative needs (Goodyear et al., 2019; Hofer, 2023). Further exploration on how educators may be able to use technology to provide additional support and feedback shared through virtual mediums (Hill et al, 2020).

Alignment with Previous Studies

The findings of the research study are consistent with previous studies in the literature base that have underscored the insufficient readiness of students in mathematics and science if intervention is not provided (Frommelt et al., 2023; Goodner, 2021). According to the participants in the study, students continue to encounter obstacles in basic mathematical skills, such as computation, calculation, numeracy, and number sense development. This impediment directly affects students' ability to master intricate, vertically aligned skills (Wexler, 2020; Widya et al., 2019). These foundational math skills culminate in proficiency in skills, such as multiplication, division, geometry and beginning algebra skills. However, if a student lacks the foundational components, they may begin to falter. To address these inadequacies, educators in the classroom must prioritize mastering fundamental concepts before progressing to more advanced skills (Eun, 2019; Smolucha & Smolucha, 2021). By doing so, students can build a solid foundation to progress further in their academic STEM journey (Felder & Brent, 2024).

Extension of Research

The researcher strongly believes in the significance of expanding the current research on math and science in academics at the elementary level. This expansion would enable an enhancement of the academic results for rural Texas students at the elementary level. Currently, most of the research on this topic pertains to students at the secondary level or those not being educated in rural American public schools. Unfortunately, these factors made it difficult to gather a baseline for initial comparison with peers and educators. The researcher suggests incorporating research on elementary students could contribute to a more comprehensive comparison of education in research materials.

Learning at the elementary level is not merely rudimentary master of skills, but instead provides students a roadmap to how to learn effectively (Hom & Dobrijevic, 2022). Elementary learning should be viewed as more foundational, as these educators teach the precursor skill for success in higher math and science content. The 3rd, 4th, and 5th-grade levels are crucial for students, as they are still learning to learn and building their foundational educational understanding through scaffolding or modeling by the educator (Fauth et al. 2019; Institute of Education Sciences, 2022). In contrast, their secondary peers are expected to apply information to more complex concepts, which is why it is essential to understand the foundation level of learning (Ardoin, 2017). Secondary educators typically do not have the time built in to teach foundational skills or reteach missed content at a more fundamental level. Participants shared in the data collections they felt time impediment perpetuated the learning gaps if not directly addressed.

Unfortunately, research on both math and science at the elementary level in America is less common compared to other topics relating to core content. Many of the present studies relating to math and science or STEM topics in the literature base are conducted overseas where educational setup or access is different than the current educational structures in rural American school districts. Despite this, the importance of considering elementary-level research in this field cannot be overlooked. The researcher asserts that the lack of research in this area may continue to hinder progress in these subjects. Therefore, it is imperative to prioritize research on math and science at the elementary level to enhance academic results for rural American students.

Divergence from Existing Literature

The results and feedback on the central research question aligned with the majority of the findings central to the research base, considering that one of the major themes that was not as frequently mentioned was time constraints and time-based compromising in the classroom. One of the primary themes of concern among educators in the rural-serving district in the research was the insufficiency of time. Specifically, the educators expressed a sense of inadequacy in the available time to complete their tasks and meet the needs of their students. The educators voiced concerns over time to cover content, time to work with students (whole or in small groups), and lack of time, causing content to be shortened or removed. This issue significantly impacts the quality of education delivered to students in the district. Addressing this challenge would require a comprehensive approach that considers the unique circumstances and resources available to the district.

While the body of research did not exclusively explore the timing components, it did provide insights about them concerning another subject. Significant timing elements were mentioned at both elementary and secondary levels, prompting consideration that may indicate the theme has a wider impact or significance than previously assumed. Further investigation is required to comprehend the implications of these findings comprehensively. Additional research and consideration may prompt a better understanding of the impact time has on math and science as it relates to STEM education.

Implications for Policy or Practice

Applicable science and math exposure at the elementary level is one idea for bringing more content to third, fourth, and fifth-grade students. Part of this would involve showing the student what math and science look like outside the classroom, thus providing context for their learning. Students and educators may be unaware that many jobs require more than just straight calculation to be complete; instead, applying dimensions, depth, and application in a real-life context brings these learnings to life. For educators, the foundation is built upon, requiring them to see math and science as a continuum of learning. The exposure may encourage stakeholders to address content, take time to integrate, and ensure learning is cyclical.

Implications for Policy

The Texas Education Agency is the governing body for educators in the state of Texas and sets the standard for learning and state assessment taken by every third, fourth, and fifth grader. The state's awareness of the challenges faced in the classroom is not always felt at the classroom level. While the researcher does not suggest doing away with standardized testing, revision of how the state asks the students to produce their knowledge may need to be considered. Additionally, the consideration of the reading ability and accessibility of rural districts to access the same opportunities and facilitate educator collaboration in the tested core subjects.

Implication at State Education Level

In the classrooms, educators are encouraged to make learning student-centered, customized, differentiated, and applicable to their students. However, at the end of each year, all Texas students take at least two or three standardized tests, dependent on their grade level. The current testing procedures allow for no ability to recognize or prove individual learning or growth with the given material. The idea that all students learn the same way was dispelled in the research; however, students continue to be asked to work through standard question-and-answer assessments.

The low or limited ability to read is felt to be detrimental to learning and not an accurate demonstration of the student's knowledge. Based on the participant testimony and educators' data tracking concern about students' reading ability effecting the success rate of student was seen as a valid concern. If students cannot independently read the instruction, text, and questions, concern over the validity of standardized math and science assessments may need consideration. As one of the fifth-grade educators shared, the science assessment has turned more into a reading test than an ability to prove science competency. This type of assessment does not allow for more vulnerable populations 504, dyslexia, special education, and language learners the same consideration as neurotypical peers. The perception that science or math is inaccessible to students due to a reading challenge may need to be replaced with a consideration of how we are encouraging progress and personalized acquisition.

One consideration may be in the form of portfolios or student-guided learning with the ability to submit proof of mastery. While potentially more work at the state level, the ability for a student to demonstrate their knowledge in a more individualized fashion may provide more educational reflection for students and educators. Portfolios or student-guided learning would also address concerns over the way students are asked to produce their knowledge, opting for a more diverse learning presentation. For educators it may provide them the opportunity to focus on individual student growth, mastery of foundational and extended knowledge to continue student-centered learning environments. This would also remove the need for the early testing practice and STAAR blitz during the second semester, as spoken about in the data sources.

One of the deficits brought forth in the literature is the opportunities rural students have to experience hands-on learning and access to STEM-related experiences. Students who see opportunities strive for opportunities in their own lives. Consideration for how the state is extending opportunities to rural populations should be considered in line with STEM education. In comparison, some speakers focus on STEM in the larger districts, considering whether more distant districts can access this material equitably. This resource might be science ambassadors, STEM in literature programs, and programming specifically to raise science engagement may need to be considered, primarily through alternative mediums when travel is a hindrance for most rural districts. In comparison, a single district may be able to offer opportunities; however, they can only fund so much independently. Prioritized funding at a higher level is required to equal the playing field for the students in rural settings who may never have left their town to access incredible, more extended opportunities.

Rural School District Implications

A research-based curriculum for Makerspace/STEM Lab would be a potential consideration for the rural districts that have makerspace labs at their elementary level. One of the rural districts has students participating in a makerspace program as part of a weekly rotation schedule. Consideration of implementation of a research-based standardized curriculum at this level may offer the students structure and exposure, continuing to impress on the valuable nature of the math and science content outside of the core classroom. This would additionally allow the students to see the science and math curriculum as part of an integrated approach to their learning instead of a stand-alone component (Sutherland, 2023). While not applicable at all levels, theoretically, the opportunity may enhance student educational awareness of the material and as an opportunity to develop a problem-solving approach to unknown challenges.

Learning rounds in science classrooms would be a suggestion to improve the material, frequency, and depth of content at the elementary level. The consideration of educators, administrators, and other stakeholders examining the learning completed in the science period may offer the ability to refine and enhance the learning of science in grades third, fourth, and fifth. When time is allotted, and content completion is monitored, context is provided to the educator that value is placed on the material. The learning round process allows the stakeholders to get a snapshot approach to the student learning by examining questions and considering the effectiveness of the learning. Considerations include, "What do we want the student to learn? How will we know they have learned it? What do we do when they do not learn it? and What do we do if they already know it?" (DuFour et al., 2021, p. 119). These considerations are integrated into the PLC process to raise learning to that level. These previews of learning also offer educators the opportunity to see how other educators are integrating and teaching on their own campus. The idea addresses one of the concerns of education in rural schools that may be isolated or singular in their content or grade level.

Dedicating time to a non-tested subject may be a challenge, especially when other core content is seen as lacking. For administration, it is understandable to concentrate on filling the holes in math or reading first before approaching science. Some districts have previously chosen math over science under the assumption that students will catch up or can get the same value from a short video. This can also put resolute science educators having to address unfamiliar content or, worse, feel that they are not valued as their subject's time is reallocated. The concern voiced in the research about time is very much dependent on the district, its setting, and prioritizing. However, the ability to use the material in a cross-curricular fashion may offer some relief to educators as they continue to contend with limited science in the classroom. Considering how the district could enhance science exposure would be a step forward for students to begin to lay the foundational knowledge they have lacked in the past. Without science exposure, students at the elementary level are going to continue to be ill-equipped in the pursuit of higher STEM learning.

Implications for Practice

Potential implications for practice may be transferable to the rural population of educators and the schooling systems in which they work. With these, the students could feel the effects of educators' efforts to change the current mindset and increase the content knowledge students acquire at an earlier age. The leveling of knowledge for students was an important finding in the research; however, it may not be as applicable to more affluent students, depending on the school population.

With the right tools and techniques, educators may play a crucial role in nurturing pre-STEM skills among students in rural and underserved populations. By incorporating STEM skills into lesson plans and encouraging their development, students can benefit from a broader range of learning opportunities that may not have been available to them before. The joint process of making students aware of opportunities for math and science skills allows them to be more equipped going into the secondary level. The effort of elementary educators may be incredibly impactful in rural settings, where such skills may be particularly valuable for students' long-term success. By equipping educators with strategies to foster these skills, students can gain access to new knowledge, career paths, and exploration opportunities that they may not have previously considered.

Theoretical and Empirical Implications

The three themes identified based on participant responses were (a) time constraints, (b) depth of knowledge, and (c) educator feedback. This section will discuss the description provided through the data source in correlation to the empirical findings and theoretically reviewed literature based on chapter two. Reviewing these implications allows considerations and contributes to improving STEM and SMART goal planning in the elementary classroom.

Empirical Implications

The three themes identified from the study related to the empirical research found in the related literature and research base were (a) time constraints, (b) depth of knowledge, and (c) educator feedback. The research data supported these themes that were brought forth and aligned with connections in the lived experience of the participants. The description of the themes is broken down and connected back to the central research question posed at the onset.

Educators Address Math and Science Based on Priority and Preference

Time constraints are not typically discussed by educators in the research literature base. When discussed with participants in rural school districts, educators are often challenged to manage their time effectively while teaching. This is particularly true when it comes to setting SMART goals (Latham, 2020) for STEM education at the elementary level (Affifi & Colucci-Gray, 2020). According to the research collected from the participants, time constraints were found to be the most commonly cited and documented theme. These constraints affect the planning and implementation of math and science goal revision at the third, fourth, and fifth-grade levels. Due to limited time, educators often find themselves making compromises, consolidating, or eliminating portions of teaching (Fauth et al., 2019) to ensure that the educators remain aligned with the teaching scope and sequence in their respective districts (Long, 2023). This may lead to frustration and dissatisfaction among educators, as the educators are unable to cover the content in-depth and incorporate creative ways to teach foundational knowledge and skills. Up to 50% of rural students are below grade level in one or more content area (Texas Education Agency, 2017; Texas Educational Agency, 2019) or are not equipped with the appropriate skills for the content (Texas Rural School Task Force, 2017). The pressure increases in a continuous cycle of trying to teach and catch up, resulting in potential teacher burnout (Miller, 2020).

When the participant educators spoke about the process of math and science education, they shared that science is typically preferred over math because of the broader content covered. Adding to the preference the tangible and experiential view that science brings can create a more engaging classroom (Visually, 2023). Students can see the direct science in front of them when having experiences with plants, animals, water, and weather. In some cases, students prefer science at the elementary level because it requires less reading and more visuals, and computation is limited (Rhodes et al., 2020). However, not all educators felt they had as strong a handle on the science concepts compared to the math content (Chen & Huang, 2020). Participants voiced that the higher and more complex science required more planning and preparation. Setting up stations, experiments, digital learning (Schrum & Summerfield, 2018), and deepening science content knowledge (Sher, 2020) is also prohibitive in an already shortened time period if the teacher is not departmentalized. This sentiment was expressed by those participants who were self-contained at the elementary level in this research.

Science Educators Feel Students Lack Foundational Knowledge (third-fifth)

The trend of condensing curriculum to fit time has directly impacted science teaching in the districts participating in the research. As discussed in the themes, science is often a lower priority (DeLeon et al., 2019) than math at the third and fourth-grade levels. While departmentalizing was thought to allow for dedicated time (City et al., 2018), the teachers participating in the research spoke to the contrary. This led to all three fifth-grade science teachers expressing concern about the foundational knowledge of science when the students reached their classrooms. This follows the concern brought to light in the research about the disproportionality of science and math time allotment at the elementary level across the state (Gauthier, 2019; Goodner, 2021). According to The National Survey of Science and Math Education 2018 report, the importance of uniform time for all STEM subject matters is critical for growth, but the execution in the classroom at the elementary level varied according to the participants (Gauthier, 2019).

Educators Expressed a Struggle to Align with State Expectations

The National Assessment of Educational Progress (2019) showed that reductions in the emphasis on pre-STEM, such as critical thinking, problem-solving, and foundational content, have directly impacted national testing scores (Goodner, 2021). This highlights the need for a solid foundation and observable integration to change learning trends in the rural school setting (Wang et al., 2019). Preparation for rural schools aligning with state testing does not always offer a chance to prepare students for applicable success (Long, 2023); instead, it focuses the students on approaching, meeting, or mastering the state's expected standard (Texas Educational Agency, 2019). For the educators working with rural students, the participants feel as though they must work harder to close their students' learning gaps. The rural population continues to grow each year, creating a sense of urgency to consider the effect rural deficits have on the state and its education (Showalter et al., 2019)

Theoretical Implications

The study's theoretical framework is based on goal setting and the research design through the five tenets developed in 1968 by Edwin Locke (Locke & Latham, 2019). The five tenets: clarity, challenge, commitment, feedback, and complexity were used as a starting point for the description and understanding of the lived experience of the educators building SMART goals in their classrooms. The study aligns and shows that SMART goal setting is attainable at the elementary level with pre-STEM educators and students. When educators use the components, the educators are able to enact the learning process with their students to set and reach goals at each level (Latham & Locke, 1991).

For the study, the five tenets were aligned with the five sections of SMART goal planning, allowing educators to see the connection between theory and practice. The pairing was the ability of the students to set objectives and goals that are imperative to success in elementary, secondary, and professional settings. Students need the support of the educator to model and be mentors as they learn the process and its components. Educators' scaffolding steps allow the student to access the more profound material through the element of challenge and clarity, understanding the time progress. Both SMART goals and Locke’s goal-setting theory require grit, determination, resilience, and reflection to reach the end, especially if refinements are required. Following the predictable intervals through check-in, mini-milestones, or progress monitoring increases the goal's chances for success (Locke & Latham, 2019; Smolucha & Smolucha, 2021). The complexity of the task is broken into attainable steps, making the challenge less daunting, especially if the goal-setter is a child.

According to Locke’s goal theory, clarity is the first step for educators when goal setting for their class or for individual goals (Latham & Locke, 1991, 2007; Locke & Latham, 2019). Clarity is seen as specific when integrating SMART with goal-setting tenets (Latham, 2020; Leonard & Watts, 2022). The educators created a successful strategy with a well-defined and specific goal, allowing the educator and learner to produce the outline, which was monitored throughout (Locke & Latham, 2019). The individual educators identify whether the goal is procedural, process, or product-based, further integrating clarity . The educator explicitly outlines a clear vision of what was to be achieved, the areas to improve upon, or the accomplishments (Latham & Locke, 1991, 2007; Locke & Latham, 2019). As the goal writer employs a standardized approach, the procedure requires less uncertainty than a goal with an unclear objective (Latham, 2020; Locke & Latham, 2019). Setting clear goals and objectives will ensure that a class, educators, or individuals can track toward success.

Achieving progress in goal planning heavily relies on feedback (Latham & Locke, 1991, 2007; Locke & Latham, 2019). Integrating SMART with goal-setting principles entails measurable feedback from an outside source, such as peers or educators (Latham, 2020). Feedback is a critical component in achieving measurable progress during the goal-setting process, leading to higher levels of success and achievement. The second set of eyes was discussed to aid the student's reflective process. According to Locke (1968), feedback informs the learner about the information, refinement, or redirection relating to the goal or its progress (Locke & Latham, 2019). Without clear and measurable feedback, improvements made during goal setting may not be replicated (Latham, 2020). For the participants, analyzing, giving feedback, and identifying errors were used to assist learners in adjusting and achieving more positive outcomes in the classroom. The adjustment allows for refocusing as a refinement to complete and reach goals more effectively (Locke & Latham, 2019). The refinement was spoken about throughout the focus group by the fifth-grade educators who see their student's ability to track data as a means to more successful learning independently. Necessary insights were specific to the learner, ensuring learning is consistent and cyclical (Latham, 2020; Latham & Locke, 1991, 2007; Locke & Latham, 2019). Therefore, feedback is essential in attaining measurable progress during the goal-setting process, leading to higher levels of success and achievement (Locke & Latham, 2019).

The level of complexity in achieving growth or a task varies from classroom to classroom and was found to be without a standard metric by the educators, even across their campuses. Complexity should align with relevance when integrating SMART with goal-setting principles to ensure attainability. The participants spoke about the necessity of flexibility and addressed the learner's ability level. The participants shared that they addressed this in the planning regarding individual rigor within the capacity. Complexity aligned with relevance allowed the educator to tailor their goals to their unique situations, making them more achievable based on their classroom and grade level (Latham, 2020).

The focus on achievable challenges by selecting targets that can be accomplished with a combination of time, effort, and support in the educator's planning produced fruitful results (Latham & Locke, 1991, 2007). For educators, when the planning yielded results, they experience a sense of accomplishment. As shared, professional or classroom goals can be daunting for educators; those who embrace them share a genuine desire for growth in their practice. The manageable steps they took with their students inspired confidence and motivation.

Limitations and Delimitations

It is essential to acknowledge that the research has certain limitations that must be considered. The delineation was considered and planned, and limitations appeared once the research began due to external factors. The delimitation was the grade level and content subject for educators to participate. The first limitation was that the study involved a relatively small sample size of educators. The second limitation was the laps in the literature between 2020-2022 due to school closures, and the final limitation addressed was participant reluctance, which may not be representative of all rural panhandle districts. Additionally, the study was conducted in a rural location in North Texas, and hence, its findings may not be universally applicable.

The planned delineation of educators was specific to the grade and core content they educated. All educators were required to teach third, fourth, or fifth grade and instruct in math, science, or both core subjects. This helped to provide specific, meaningful consideration in the pre-STEM areas. The educators were also required to have had prior knowledge and training on goal planning by their district of employment. Educators reported that this is also referred to in some districts as goal tracking or data goal tracking. When reviewed, the intent was the same regardless of what the district referred to it in name. This review of the terminology was unplanned but provided understanding for educators and the researcher that vertically and horizontally educators were using the same methods in reviewing with their students. The limitations in the study were numerous and unplanned; in future research, additional consideration may be put in place to avoid the present limitations within the study.

The first limitation was the small sample size of 10 educators who completed all the necessary data collection portions. These educators participated in focus groups, individual interviews, and online questionnaires. Over 43 separate educators were asked verbally or through electronic communication to participate in the research. The initial sample pool of 20-25 was extended to encourage more participants. This extension was nearly double the initial sample pool due to the desire for rich and diverse feedback about the successes and challenges of the panhandle rural communities being served. The sample pool contained 10 of the 115 districts served by regions 16 and 17; they accounted for over 359 square miles between these ten districts.

An unexpected limitation associated with the study came in the form of the research body and research release of information in connection with school closure in Texas. Starting in March of 2020 through September of 2020, Texas schools were not operational. Beginning in September 2020 through May 2021, panhandle schools were confined to online participation for students and online instruction for educators, and this 18-month school closure also led to limited research and publication from the Texas Education Agency about rural education and rural education task force. This affected the literature body on school progress as limited research and reporting were being conducted and published, with students and educators being displaced from their classrooms. The researcher acknowledges that there is a larger than the typical number of publications referenced outside the typical five-year preference of literature. However, limitations on publication were apparent when gathering reference material in the 2020 to 2022 date ranges.

Participant reluctance was a considerable limitation when working with the sample size and participants. More than half of the participants qualified to participate showed reluctance to answer, and some were concerned with anonymity. Even with the numerical pseudonyms, educators voiced concern that they could be distinguished because they were their district's sole third, fourth, or fifth-grade educators or were concerned that they were solely responsible for subject matter on their campus. It was also apparent in the educators' desire to meet through digital mediums when they completed their interviews, answered questions, and organized the initial focus group. Concerns voiced by participants contributed to the smaller sample size overall and resulted in decreased distinguishing data about participants, such as years taught or gender pronouns when describing the participants.

Recommendations for Future Research

The qualitative process was an excellent introduction to the topic of STEM SMART goal planning in the classroom at the elementary level. Based on the data presented and feedback on the goal implementation and growth, there are several avenues of future research available. Ideas for future research could be mixed method STEM SMART goal comparison and a quantitative inspection of core time compared to progressive scoring with both settings in a rural school district setting.

One avenue for future research would be a mixed-method approach to STEM and SMART goal success or challenges. The mixed method could incorporate qualitative teacher-student feedback with the quantitative growth or decline seen by the students across the assessment timeframe. The approach would allow a more in-depth comparison and the ability to track, using percentages, the connection between SMART goal tracking and success rate at the elementary level. Extending the initial SMART goal considerations would give additional data on how elementary is used and track student success in correlation to the content. This would have to be centralized to the state testing assessment as dictated by the state or federal education agency.

Another potential research topic would be to employ a quantitative inspection of core time compared to progressive scoring. This could be completed using the previous concern over math and science or trading time in social studies content. This would provide an extension to the research, examining to what degree the incorporation or limitations of a subject, such as science and math, affect the scoring in progressive years. As voiced by the participant, science at the elementary level is often limited or condensed to accommodate the progress of scores in reading or math. Considering the condensing of the subject matter, does the approach deliver better results in math by choosing it to take priority over science education? The research would provide additional context to the trends and experiences executed in many self-contained and departmentalized elementary schools in rural school systems.

Conclusion

The ability to engage and create learning for students is at the heart of the educator's purpose. Regardless of the subject, students require a steady foundation through mentoring, cultivated connections, challenges connection, and challenges to ensure they receive the education that will carry them to success. Elementary educators are tasked with creating this foundation in math and science. The challenges before them, such as time, knowledge, and assessment, create barriers to goal planning in the classroom. Based on the data results, by equipping educators with strategies to encourage the promotion of these pre-STEM skills through planning, students may have more growth opportunities not previously represented in the setting. These processes with rural educators can affect students' long-term learning, leading to long-term options for access to knowledge, careers, and situational exploration not previously considered.

References

Affifi, R., & Colucci-Gray, L. (2020). Chapter 4: Between will and wilderness in STEM education. In P. Burnard (Ed.), *Why Science and Art Creativities Matter* (pp. 79–99). essay, Brill.

Aghera, A., Emery, M., Bounds, R., Bush, C., Stansfield, B., Gillett, B., & Santen, S. (2018). A randomized trial of smart goal-enhanced debriefing after simulation to promote educational actions. *Western Journal of Emergency Medicine*: *Integrating Emergency Care with Population Health*, *19*(1).112-120. https://doi.org/10.5811/westjem.2017.11.36524

Aguilera, D., & Ortiz-Revilla, J. (2021). Stem vs. steam education and student creativity: A systematic literature review. *Education Sciences*, *11*(7), 331. https://doi.org/10.3390/educsci11070331

America creating opportunities to meaningfully promote excellence in technology, education, and science act (COMPETES). (2007). H.R2272, 110th Congress 1st Session. https://www.congress.gov/bill/110th-congress/house-bill/2272/all-info

Ardoin, S. (2017). *College aspirations and access in working-class rural communities: The mixed signals, challenges, and new language first-generation students encounter*. Lexington Books.

Bapoğlu-Dümenci, S. S., Muş, Ü. E., & Demir, E. (2021). Analysis of case problems by STEM activities in children's stories and their effect on problem-solving skills. [Çocuk Hikayelerindeki Problem Durumlarının Stem Etkinlikleri ile Çözümlenmesi ve Problem Çözme Becerileri Üzerindeki Etkisi] *Bartin Üniversitesi Egitim Fakültesi Dergisi, 10*(2), 378-389. https://doi.org/10.14686/buefad.816297

Beale, J. (2020, January 7). *Barak Rosenshein's "principles of instruction."* CIRL. https://cirl.etoncollege.com/barak-rosenshines-principles-of-instruction/

Benden, D. K., & Lauermann, F. (2022). Students' motivational trajectories and academic success in math-intensive study programs: Why short-term motivational assessments matter. *Journal of Educational Psychology, 114(5),* 1062–1085. https://doi.org/10.1037/edu0000708

Berkman, E. T. (2018). The neuroscience of goal and behavior change. *Consulting Psychology Journal, 70*(1), 28–44. https://doi.org/10.1037/cpb0000094

Beyer, C. (2022, October). *Edmund Husserl*. Stanford Encyclopedia of Philosophy. Retrieved May 7, 2023, from https://plato.stanford.edu/entries/husserl/.

Biesta, G. (2015). Freeing teaching from learning: opening up existential possibilities in educational relationships. *Studies in Philosophy and Education*, pp. *34*, 229–243 https://doi.org/10.1007/s11217-014-9454-z.

Bostwick, K. C. P., Collie, R. J., Martin, A. J., & Durksen, T. L. (2020). Teacher, classroom, and student growth orientation in mathematics: A multilevel examination of growth goals, growth mindset, engagement, and achievement. *Teaching and Teacher Education*, *94*, 103100. https://doi.org/10.1016/j.tate.2020.103100

Brodie, K. (2019). Teacher agency in professional learning communities**.** *Professional Development in Education***,** *47*(4), 560–573. https://doi.org/10.1080/19415257.2019.1689523

Brown, B. (2017). *Rising strong how the ability to reset transforms the way we live, Love, parent, and lead*. Random House Inc.

Brown, B. (2018). *Dare to lead: Brave work. tough conversations. Whole hearts.* Random House Publishing Group.

Brown, B. (2022). *Atlas of the heart: Mapping meaningful connections and the language of human experience*. Random House Large Print.

Caena, F., & Vuorikari, R. (2021). Teacher learning and innovative professional development through the lens of personal, social, and learning to learn European key competence. *European Journal of Teacher Education*, *45*(4), 456–475. https://doi.org/10.1080/02619768.2021.1951699

Carter, K. C. (2020). STEM education in the elementary school classroom (master's thesis, Dominican University). https://doi.org/10.33015/dominican.edu/2020.EDU.11

Chen, C. C., & Huang, P. H. (2020). The effects of STEAM-based mobile learning on learning achievement and cognitive load. *Interactive Learning Environments*, 1–17. https://doi.org/10.1080/10494820.2020.1761838.

City, E. A., Elmore, R. F., Fiarman, S. E., Teitel, L., & Lachman, A. (2018). *Instructional rounds in education: A network approach to improving teaching and learning*. Harvard Education Press.

Connelly, L. (2016). Trustworthiness in qualitative research. *Medsurg Nursing*, *25*(5), 435–436.

Committee on STEM education national science and technology council. (2013). Federal Science, Technology, Engineering, and Mathematics (STEM) Education: 5-Year Strategic Plan. Retrieved from https://eric.ed.gov/?id=ED570924

Creswell, J. W. (2023). *Research design uses qualitative, quantitative, and mixed methods approaches***.** SAGE.

Creswell, J. W., & Guetterman, T. C. (2021). *Educational research: Planning, conducting, and evaluating quantitative and qualitative* (6th ed.). Pearson Education Limited.

Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry & research design: Choosing among five approaches* (Fourth edition.). SAGE.

Cromartie, J. (2020, December). *Rural-urban continuum codes*. Rural-Urban Continuum Codes. https://www.ers.usda.gov/data-products/rural-urban-continuum-codes/

Daly, C., Milton, E., & Langdon, F. (2022). How do ecological perspectives help understand schools as sites for teacher learning? *Leadership for Professional Learning*, pp. 192–203. https://doi.org/10.4324/9781003357384-13

DuFour, R., DuFour, R., Eaker, R., Many, T., & Mattos, M. (2021). *Revisiting professional learning communities at work: Proven insights for sustained, substantive school improvement* (2nd ed.). Solution Tree.

DeLeon, E., Pena, R., & Vasquez, A. (2019). Challenges supports, and successes of teachers implementing SMART goals in rural settings. *Journal of Education and Learning*, *8*(2), 104–115.

Denzin, N., & Lincoln, Y. (1994). *Handbook of qualitative research.* Thousand Oaks, CA, U.S.: Sage Publications Inc.

Deville, K. (2023, April). STEM vs. STEAM: Making room for the arts [web log]. Retrieved August 4, 2023, from https://original.newsbreak.com/@krystal-deville-1661229/2987739988853-stem-vs-steam-making-room-for-the-arts.

Diefes-Dux, H., Mena, I., & Burnett, M. (2016). Setting SMART goals to improve student learning. *Journal of STEM Education: Innovation and Research*, *17*(3), 44–55.

Dick, A. (2017). Rural students. *Greater Texas Foundation*. https://www.greatertexasfoundation.org/wp-content/uploads/2021/08/Brief-Rural.pdf

Drescher, J., Podolsky, A., Reardon, S. F., & Torrance, G. (2022). The geography of rural educational opportunity**.** *RSF: The Russell Sage Foundation Journal of the Social Sciences*, *8*(3), 123–149. https://doi.org/10.7758/rsf.2022.8.3.05

Drucker, P. F. (2007). Management by objectives and self-control**.** *The Essential Drucker***,** 84–94. https://doi.org/10.4324/9780429347979-9

Every student succeeds act. (2015). U.S. Department of Education. Retrieved from https://www.ed.gov/essa?src=rn

Erlingsson, C., & Brysiewicz, P. (2013). Orientation among multiple truths: An introduction to qualitative research. *African Journal of Emergency Medicine*, *3*(2), 92–99. https://doi.org/10.1016/j.afjem.2012.04.005

Ertmer, P., Ottenbreit-Leftwich, A., & York, C. (2018). Teacher confidence and competence in the implementation of SMART goals in STEM education. *Journal of Educational Computing Research***,** *56*(4), 559–577.

Eun, B. (2019). The zone of proximal development as an overarching concept: A framework for synthesizing Vygotsky's theories. *Educational Philosophy and Theory***,** *51*(1), 18–30. https://doi.org/10.1080/00131857.2017.1421941

Fauth, B., Decristan, J., Decker, A.-T., Büttner, G., Hardy, I., Klieme, E., & Kunter, M. (2019). The effects of teacher competence on student outcomes in elementary science education: The mediating role of teaching quality. *Teaching and Teacher Education, 86*. https://doi.org/10.1016/j.tate.2019.102882

Felder, R. M., & Brent, R. (2024). *Teaching and learning STEM: A practical guide* (2nd ed.). Jossey-Bass.

Feng, X., Helms-Lorenz, M., & Maulana, R. (2023). Profiles and developmental pathways of beginning teachers' intrinsic orientations and their associations with effective teaching behavior. *Learning and Individual Differences*, *107*, 102362. https://doi.org/10.1016/j.lindif.2023.102362

Finkbeiner, A. (2022, April 1). Meg Urry in scientific American on women in astronomy. Women are creating a new culture for astronomy. *Scientific American*. https://www.scientificamerican.com/article/women-are-creating-a-new-culture-for-astronomy/

Forner, M. (2016). *Hardball leadership: How to achieve student academic success in a rural school district***.** Rowman & Littlefield.

Fouad, N. A., Chang, W. H., Wan, M., & Singh, R. (2017). Women's reasons for leaving the engineering field**.** *Frontiers in Psychology,* pp. *8,* 875. https://doi.org/10.3389/fpsyg.2017.00875

Frey, N., & Fisher, D. (2022, November). *Setting goals that work*. ASCD. https://www.ascd.org/el/articles/setting-goals-that-work

Frommelt, M. C., Schiefele, U., & Lazarides, R. (2023). The contributions of teachers' educational interest and relational goals to instructional quality and student interest in mathematics classrooms. *Contemporary Educational Psychology*, *73*, 102184. https://doi.org/10.1016/j.cedpsych.2023.102184

Gall, M. D., Borg, W. R., & Gall, J. P. (2007). *Educational research: An introduction*. Pearson.

García, E., & Weiss, E. (2017, September). *Education inequalities at the school starting gate: Gaps, trends, and strategies to address them***.** Economic Policy Institute. https://www.epi.org/publication/education-inequalities-at-the-school-starting-gate/#epi-toc-13

Garger, S. J., & Guild, P.B. (1984). Learning styles: The crucial differences. *Curriculum Review*, pp. 23, 9–12.

Gauthier, T. (2019). Gaining effectiveness in the self-contained classroom. *Social Studies Review, pp. 58*, 12–16.

Gereluk, D., & Corbett, M. (2020). *Rural teacher education: Connecting land and people***.** Springer.

Gleason, J., Belcher, J. D., Britt, D., & Savich, P. (2008). Incorporating a critical pedagogy of place in the mathematics classroom: Rural school bussing. *The Journal of Teaching and Learning, 5***.**

Glimcher, L. (2014, May). *Why we need women to advance in science*. Huffington Post. https://www.huffpost.com/entry/why-we-need-women-to-adva_b_5024263

Goodman, M. (2013, March). *Mayim Bialik talks about neuroscience, the big bang theory, and science careers for girls*. Reel Life with Jane. https://www.reellifewithjane.com/2013/03/mayim-bialik-talks-neuroscience-big-bang-theory-science-careers-for-girls/

Goodner, P. (2021, August). Focusing on science with elementary students this year. *Edutopia*. Retrieved June 2, 2023, from https://www.edutopia.org/article/focusing-science-elementary-students-year/

Goodyear, V. A., Parker, M., & Casey, A. (2019). Social media and teacher professional learning communities. *Physical Education and Sport Pedagogy*, *24*(5), 421–433. https://doi.org/10.1080/17408989.2019.1617263

Grossman, P. L., Loeb, S., Birkeland, S., & Johnson, S. (2021). Is fast-track preparation enough? It depends. In *Alternative Routes to Teaching: Mapping the New Landscape of Teacher Education* (pp. 196–214). Essay, Harvard Education Press.

Han, S. J., & Stieha, V. (2020). Growth mindset for human resource development: A scoping review of the literature with recommended interventions. *Human Resource Development Review*, *19*(3), 309–331.https://doi.org/10.1177/1534484320939739

Harvard University. (2015, September). *Learning communities*. Center on the Developing Child at Harvard University. https://developingchild.harvard.edu/collective-change/key-concepts/learning-communities/

Hassaram, B., Robertson, P. M., & García, S. B. (2018). Challenges and possibilities of scaffolding critical reflection and cultural responsiveness for pre-service special educators. *Journal of Teaching and Learning*, *12*(2), 1–22. https://doi.org/10.22329/jtl.v12i2.5767

Hill, C., Rosehart, P., St. Helene, J., & Sadhra, S. (2020). What kind of educator does the world need today? Reimagining teacher education in post-pandemic Canada. *Journal of Education for Teaching*, *46*(4), 565–575. https://doi.org/10.1080/02607476.2020.1797439

Hofer, S. (2023, June 1). *Video coaching as a tool to retain new teachers*. Edutopia. https://www.edutopia.org/article/video-coaching-new-teachers

Holland, M. R. (2022, September). *Plainview ISD enrollment slightly decreased from last year***.** Plainview Herald. Retrieved April 1, 2023, from https://www.myplainview.com/news/local/article/Plainview-ISD-enrollment-slightly-decreases-from-17460865.php

Holmes, A. G. (2020). Researcher positionality – a consideration of its influence and place in qualitative research - a new researcher guide. *Shanlax International Journal of Education*, *8*(4), 1–10. https://doi.org/10.34293/education.v8i4.3232

Hom, E. J., & Dobrijevic, D. (2022, October 26). What is STEM education? *LiveScience*. Retrieved from https://www.livescience.com/43296-what-is-stem-education.html

Husted, T., & Kenny, L. (2014). The political economy of education finance: The case of Texas. *Journal of Education Finance*, 40(1), 1–16. https://www.muse.jhu.edu/article/553206.

Hughes, R. (2020, October). Teachers play a critical role in shaping girls' future as coders. *The Conversation*. Retrieved September 12, 2021, from https://theconversation.com/teachers-play-a-critical-role-in-shaping-girls-future-as-coders-146656

Institute of Education Sciences. (2022). *Evidence-based teaching practices - Institute of Education Sciences*. Evidence-based teaching practices. https://ies.ed.gov/ncee/edlabs/infographics/pdf/REL_SE_Evidence-based_teaching_practices.pdf

Islam, A., Kwon, S., Masood, E., Prakash, N., Sabarwal, S., & Saraswat, D. (2020). When goal-setting forges ahead but stops short.IZA Discussion Papers, No. 13188. Institute of Labor Economics (IZA), Bonn.https://www.econstor.eu/bitstream/10419/216500/1/dp13188.pdf

Ivana, N. (2020). The effect of parental involvement on self-efficacy, student engagement, and intrinsic motivation. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3637774

Johnson, E. M. (2022). *A survey of elementary educators' self-efficacy related to STEM education.* Theses and Dissertations--Science, Technology, Engineering, and Mathematics (STEM)Education. 18. https://uknowledge.uky.edu/stem_etds/18

Johnson, P. D. (2004). Girls and science: A qualitative study on factors related to success and failure in science. *Dissertations***.** https://scholarworks.wmich.edu/dissertations/1114

Jones, M., Tammy Lee, S. C., Lauren Madden, E. C., Katherine Chesnutt, M. E., & Pamela Huff, L. P. (2021). White lab coats and elementary students' science self-concept and science self-efficacy. *Science Educator*, *28*(1), 1.

Kilday, J. E., & Ryan, A. M. (2022). The intersection of peer ecology and teacher practices for student motivation in the classroom. *Educational Psychology Review*, *34*(4), 2095–2127. https://doi.org/10.1007/s10648-022-09712-2

Kismihok, G., Zhao, C., Schippers, M. C., Mol, S. T., Harrison, S. D., & Shehata, S. (2020). Translating the concept of goal setting into practice - What 'else' does it require than a goal-setting tool? *International Conference on Computer Supported Education***.**

Lacoste, R. (2019). School libraries get "graphic": An analysis of graphic novels in the school library collection. *SLIS Connecting*, *8*(2), Article 6. doi:10.18785/slis.0802.06. Available at: https://aquila.usm.

Latham, G. (2020). Goal Setting: A five-step approach to behavior change**.** *Organizational Collaboration: Themes and Issues* (pp.11–22). Essay, Routledge. https://doi.org/10.4324/9781315881201

Latham, G. P., & Locke, E. A. (1991). Self-regulation through goal setting. *Organizational Behavior and Human Decision Processes, 50*(2), 212–247. https://doi.org/10.1016/0749-5978(91)90021-K

Latham, G. P., & Locke, E. A. (2007). New developments in and directions for goal-setting research. *European Psychologist, 12*(4), 290–300. https://doi.org/10.1027/1016-9040.12.4.290

Laux, K. (2021). Embracing a culture of STEM education: A qualitative research study. *The Qualitative Report***,** *26*(12). https://doi.org/10.46743/2160-3715/2021.5055

Leedy, P. D., & Ormrod, J. E. (2013). *Practical research: Planning and design*. 10th Edition, Merrill/Prentice Hall, Boston.

Lego Education. (2023). *Stem vs. steam: What is the real difference?* Professional Learning. https://education.lego.com/en-us/stem-vs-steam-education/

Leonard, K., & Watts, R. (2022, May). The ultimate guide to SMART goals. *Forbes Advisor*. Retrieved February 24, 2023, from https://www.forbes.com/advisor/business/smart-goals/

Lerdpornkulrat, T., Poondej, C., Koul, R., Khiawrod, G., & Prasertsirikul, P. (2019). The positive effect of intrinsic feedback on motivational engagement and self-efficacy in information literacy. *Journal of Psychoeducational Assessment*, *37*(4), 421–434. https://doi.org/10.1177/0734282917747423\

Lincoln, Y. S., & Guba, E. G. (1985). Naturalistic inquiry. *International Journal of Intercultural Relations, 9*(4), 438–439. https://doi.org/10.1016/0147-1767(85)90062-8

Locke, E. A. (1968). Toward a theory of task motivation and incentives. *Organizational Behavior & Human Performance, 3*(2), 157–189. https://doi.org/10.1016/0030-5073(68)90004-4

Locke, E. A., & Latham, G. P. (2019). The development of goal setting theory: A half-century retrospective. *Motivation Science*, *5*(2), 93–105. https://doi.org/10.1037/mot0000127

Long, C. (2023, March). *Standardized testing is still failing students in 2023*. National Education Agency. https://www.nea.org/nea-today/all-news-articles/standardized-testing-still-failing-students

Mahmood, S. (2021). Instructional strategies for online teaching in the COVID-19 Pandemic. *Human Behavior and Emerging Technologies*, *3*(1), 199–203. https://doi.org/10.1002/hbe2.218

Makarova, E., Aeschlimann, B., & Herzog, W. (2019). The gender gap in STEM fields: The impact of the gender stereotype of math and science on secondary students' career aspirations. *Frontiers in Education*, *4*. https://doi.org/10.3389/feduc.2019.00060

Marín-Marín, J.-A., Moreno-Guerrero, A.-J., Dúo-Terrón, P., & López-Belmonte, J. (2021). Steam in education: A bibliometric analysis of performance and co-words in a web of science. *International Journal of STEM Education*, *8*(1). https://doi.org/10.1186/s40594-021-00296-x

Martin, E., & Mphofe, S. (2023, February). Capturing the art and science of NASA's origami star shade. *National Geographic***.** Retrieved August 4, 2023, from https://www.nationalgeographic.com/photography/article/art-science-nasa-starshade-origami-behind-the-cover february#:~:text=Origami%20folds%20let%20the%20inner,starlight%20reaching%20a%20space%20telescope.

Mehta, N. (2022, April). *Faculty and students reflect on the STEM faculty gender gap*. The Brown Daily Herald. https://www.browndailyherald.com/article/2022/04/faculty-students-reflect-on-stem-faculty-gender-gap#:~:text=Women%20made%20up%20less%20than,in%202020%2D21%20academic

%20year&text=Women%20occupied%2021.7%25%20of%20all,Equity%20and%20Diversity%20in%202021.

Midwest Comprehensive Center. (2018). *Student goal setting: An evidence-based practice student goal setting***.** American Institutes for Research. https://files.eric.ed.gov/fulltext/ED589978.pdf

Miller, G. J. (2020). Teacher retention in a rural east Texas school district. *School Leadership Review, 15*(1), 14. Available at: https://scholarworks.sfasu.edu/slr/vol15/iss1/14

Moustakas, C. (1994). Phenomenological research methods. SAGE Publications, Inc. https://doi.org/10.4135/9781412995658

Nassaji, H. (2020). Good qualitative research. *Language Teaching Research***,** *24*(4), 427–431. https://doi.org/10.1177/1362168820941288

National Assessment of Educational Progress (NAEP). (2019, March). *NAEP report card: 2019 NAEP science assessment***.** The Nation's Report Card. https://www.nationsreportcard.gov/highlights/science/2019/

National Center for Education Statistics. (2020). *Locale boundaries*. Educational Demographics and Geographic Estimates. https://nces.ed.gov/programs/edge/Geographic/LocaleBoundaries

National Science Board. (1986). Undergraduate science, mathematics and engineering education (NSB Report No. 86-100). Retrieved from https://www.nsf.gov/nsb/publications/1986/nsb0386.pdf

Njie, B., & Asimiran, S. (2014). Case study as a choice in qualitative methodology. *IOSR Journal of Research & Method in Education (IOSRJRME), 4*(3), 35-40. https://doi.org/10.9790/7388-04313540

No Child Left Behind. (2001). H.R.1, 107 Congress 1st session. https://www.congress.gov/bill/107th-congress/house-bill/1

Northcentral University. (2023, April 27). *Chapter 4: Trustworthiness of qualitative data*. Trustworthiness of Qualitative Data - Chapter 4 -LibGuides at Northcentral University. Retrieved April 29, 2023, from https://resources.nu.edu/c.php?g=1007180&p=7392379

Nowikowski, S. H. (2017). Successful with STEM? A qualitative case study of pre-service teacher perceptions. *The Qualitative Report, 22*(9), 2312-2333. https://www.proquest.com/scholarly-journals/successful-with-stem-qualitative-case-study-pre/docview/1938994712/se-2

Office of the Federal Register, National Archives and Records Administration. (2022, December). *Govt. Manual 2022-2022 - Office of Science and Technology Policy*. [Government]. Office of theFederal Register, National Archives and Records Administration.https://www.govinfo.gov/app/details/GOVMAN-2022-12-31/GOVMAN-2022-12-31-110

Ogonosky, A., & Mintsioulis, K. (2020). *Rti-Three tiers of Behavior: Reenergizing social-emotional and behavioral components of a multi-tiered support system* (2nd ed.). Park Place Publishing.

Passmore, J., Tee, D., & Grant, A. (2021). An integrated model of goal-focused coaching. In *Coaching researched: A coaching psychology reader* (pp. 43–45). essay, Wiley. Retrieved from https://onlinelibrary.wiley.com/doi/book/10.1002/9781119656913

Patton, M. (2017). *Principles-focused evaluation: The guide* (1st ed.). Guilford Publications.

Patton, M. Q. (2015). *Qualitative evaluation and research methods: Integrating theory and practice* (fourth ed.). Sage Publications.

Pollack, E. (2013, October 3). *Why are there still so few women in science?* The New York Times. https://www.nytimes.com/2013/10/06/magazine/why-are-there-still-so-few-women-in-science.html

Pollack, E. (2015, October 10). What keeps women out of tech? *New York Times*. Retrieved September 21, 2023, from https://www.nytimes.com/2015/10/11/opinion/sunday/what-really-keeps-women-out-of-tech.html.

Que, G. (2019, November 19). *Women in STEM begins with young girls*. Medium. https://medium.com/meeplabs/women-in-stem-begins-with-young-girls-3609572d1c00

Region 17 Service Center. (2023). *Region, 17 District*. Region 17 ESC - district. https://www.esc17.net/page/admin.district

Rhodes, M., Cardarelli, A., & Leslie, S. J. (2020). Asking young children to "do science" instead of "be scientists" increases science engagement in a randomized field experiment. *Proceedings of the National Academy of Sciences of the United States of America, 117*(18), 9808–9814. https://doi.org/10.1073/pnas.1919646117

Romagnoli, A. (2017). Graphic novels and STEAM: Strategies and texts for utilization in STEAM. In J. A. Bazler & M. L. VanSickle (Eds.), *Cases on STEAM Education in Practice* (pp. 22–37). essay, Information Science Reference.

Rosenblatt, K., Badgett, K., & Eldridge, J. (2019). Teacher retention: Important considerations for rural and urban districts in Texas. *International Journal of Innovative Business Strategies, 5*(1), 274–278. https://doi.org/10.20533/ijibs.2046.3626.2019.0037

Rosenshine, B. (2012). Principles of instruction: Research-based strategies that all teachers should know. *American Educator*, *36*(1), 12–39. Retrieved from https://www.aft.org/sites/default/files/ periodicals/Rosenshine.pdf

Ross, M. B., Glennon, B. M., Murciano-Goroff, R., Berkes, E. G., Weinberg, B. A., & Lane, J. I. (2022). Women are credited less in science than men. *Nature*, pp. *608*, 135–145. https://doi.org/10.1038/s41586-022-04966-w

Rumberger, R., Addis, H., Allensworth, E., Balfanz, R., Bruch, J., Dillon, E., Duardo, D., Dynarski, M., Furgeson, J., Jayanthi, M., Newman-Gonchar, R., Place, K., & Tuttle, C. (2017). Preventing dropout in secondary schools (NCEE 2017-4028). Washington, DC: National Center for Education Evaluation and Regional Assistance (NCEE), Institute of Education Sciences, U.S. Department of Education. https://whatworks.ed.gov

Russo, J., Bobis, J., Downton, A., Livy, S., & Sullivan, P. (2021). Primary teacher attitudes towards productive struggle in mathematics in remote learning versus classroom-based settings. *Education Sciences*, *11*(2), 35. https://doi.org/10.3390/educsci11020035

Saldaña, J. (2016). *The coding manual for qualitative researchers*. SAGE.

SAMHSA. (2022). *Native connection***.** Rockville, Maryland; Substance Abuse and Mental Health Services Administration. https://www.samhsa.gov/sites/default/files/nc-smart-goals-fact-sheet.pdf

Schmider, C. (2020). *What qualitative data analysis software can and cannot do for you – an Intro Video*. MERIT Library at the School of Education: School of Education, University of Wisconsin-Madison. Accessed January 7, 2020. https://www.youtube.com/watch?v=tLKfaCiHVic.

Schrum, L., & Summerfield, S. (2018). *Learning supercharged: Digital age strategies and insights from the Edtech frontier*. Ingram Publishing.

Shabani, K., Khatib, M., & Ebadi, S. (2010). Vygotsky's zone of proximal development: Instructional implications and teachers' professional development. *English Language Teaching, 3(*4), 237-248.

Shaked, H., & Schechter, C. (2017). *Systems thinking for school leaders*. https://doi.org/10.1007/978-3-319-53571-5

Sheehan, S. (2014). A conceptual framework for understanding transcendental phenomenology through the lived experiences of biblical leaders. *Emerging Leadership Journal*, 7(1). https://www.regent.edu/journal/emerging-leadership-journeys/understanding-transcendental-phenomenology/

Sher, J. P. (2020). *Education in rural America: A reassessment of conventional wisdom***.** *Google Books***.** Routledge. Retrieved July 2, 2023, from https://books.google.com/books?id=D3ikDwAAQBAJ&printsec=frontcover#v=onepage&q&f=false.

Showalter, D., Hartman, S. L., Johnson, J., & Klein, B. (2019, October 31). *Why rural matters 2018-2019: The time is now. A report of the Rural School and Community Trust***.** Rural School and Community Trust. https://eric.ed.gov/?id=ED604580

Smolucha, L., & Smolucha, F. (2021). Vygotsky's theory in play: Early childhood education. *Early Child Development and Care*, *191*(7-8), 1041–1055. https://doi.org/10.1080/03004430.2020.1843451

Society of Women Engineers. (2023, May). *Degree attainment*. https://swe.org/research/2023/degree-attainment/#:~:text=Advanced%20Degrees%20Earned%20by%20Women&text=Howeve

r%2C%20the%20gender%20gap%20is,doctoral%20degrees%20awarded%20to%20women

Spencer, B. (2000). Long school bus rides: Their effect on school budgets, family life, and student achievement. *Rural Education Issue Digest*. https://eric.ed.gov/?id=ED448955

Stahl, N. A., & King, J. R. (2020). Expanding approaches for research: Understanding and using trustworthiness in qualitative research. *Journal of Developmental Education*, *44*(1), 26–28. https://files.eric.ed.gov/fulltext/EJ1320570.pdf

Stewart, L. (2009). Achievement differences between large and small schools in Texas. *The Rural Educator, 30(*2), 20–28. https://doi.org/10.35608/ruraled.v30i2.450

Sutherland, L., Markauskaite, L., & Cruickshank, K. (2023). A complex systems framework for examining the impact of school-based professional learning initiatives: Emerging agentic practices in a collaborative curriculum redesign. *Professional Development in Education*, pp. 1–16. https://doi.org/10.1080/19415257.2023.2217432

Texas Comptroller of Public. (2022). *Texas statewide OVERVIEW 2022 regional report*. Texas Statewide Overview. https://comptroller.texas.gov/economy/economic-data/regions/2022/texas.php

Texas Education Agency. (2017). *Elevating support for Texas rural and small schools*. Texas Education Agency. Retrieved May 23, 2023, https://tea.texas.gov/texaseducators/educator-initiatives-and-performance/rural-schools-task %20the%20U.S.%20Department %20the%20U.S.%20Department force#:~:text=According%20to,campuses%20located%20in%20rural%20areas.

Texas Education Agency. (2022, November). *An overview of the history of public education in Texas*. Texas Education Agency. https://tea.texas.gov/about-tea/welcome-and-overview/an-overview-of-the-history-of-public-education-in-texas

Texas Education Agency. (2023, February). *K-5 math*. Texas Education Agency. https://tea.texas.gov/academics/instructional-materials/tea-available-materials/k-5math#:~:text=The%20K%2D5%20Math%20COVID,learn%20in%20real%2Dworld%20scenarios.

Texas Educational Agency. (2019). *Grade level retention and student performance in Texas schools, 2016-2017.* Austin: Division of Research and Analysis Office of Standard Engagement. https://tea.texas.gov/sites/default/files/retention_2016-17.pdf

Texas Education Code. (2022). Chapter 112. *Texas essential knowledge and skills*. Subchapter A. Elementary. https://tea.texas.gov/about-tea/laws-and-rules/texas-administrative-code/19-tac-chapter-112

Texas Rural School Task Force. (2017). (rep.). *Elevating support for Texas rural and small schools*. Texas Education Agency. Retrieved June 9, 2023, from https://tea.texas.gov/sites/default/files/texas-rural-schools-taskforce-report.pdf.

Thomas, J. O., Minor, R., & Odemwingie, O. C. (2018). Exploring African American middle-school girls' perceptions of themselves as game designers. *Journal of Computing Science in Colleges***,** (35), 80–89. https://doi.org/10.4018/978-1-5225-2005-4.ch003

Tolman, S., Calhoun, D. W., Sergi McBrayer, J., Patel, N., & Cain, E. J. (2023). Inquiry as practice. *Impacting Education: Journal on Transforming Professional Practice*, *8*(2), 40–46. https://doi.org/10.5195/ie.2023.329

United States Census Bureau. (2022a, July 4). Education- school districts. Retrieved from https://www.census.gov/topics/education.html

U.S. Census Bureau. (2022b). Educational attainment in the United States: 2022. Retrieved from https://www.census.gov/newsroom/press-releases/2022/educational-attainment.html

U.S. Census Bureau. (2020). Post-secondary employment outcomes (PSEO) experimental data. Retrieved from https://lehd.ces.census.gov/data/pseo_experimental.html

University of Central Florida. (2023). *Comparing STEM vs. STEAM: Why the arts make A difference*. UCF Online. https://www.ucf.edu/online/engineering/news/comparing-stem-vs-steam-why-the-arts-make-a-difference

Urhahne, D., & Wijnia, L. (2021). A review of the accuracy of teacher judgments. *Educational Research Review*, *32*, 100374. https://doi.org/10.1016/j.edurev.2020.100374

U.S. Department of Education. (2022). Every Student Succeeds Act (ESSA). https://www.ed.gov/essa

U.S. Department of Education. (2023, January). *Science, technology, engineering, and math, including computer science*. Science, Technology, Engineering, and Math, including Computer Science | U.S. Department of Education. https://www.ed.gov/stem#:~:text=Science%2C%20Technology%2C%20Engineering%2C%20and,Science%20%7C%20U.S.%20Department%20of%20Education

Videla, R., Aguayo, C., & Veloz, T. (2021). From stem to steam: An inactive and ecological continuum. *Frontiers in Education*, *6*. https://doi.org/10.3389/feduc.2021.709560

Visually. (2023). *Seven astonishing facts about STEM*. Education. Visually by Rock Content. Biocom.org. ed.gov. Retrieved June 19, 2023, from https://visual.ly/community/Infographics/education/7-interesting-facts-about-stem-education.

Vongkulluksn, V.W., Matewos, A.M., Sinatra, G.M., et al. (2018). Motivational factors in maker spaces: a mixed methods study of elementary school students’ situational interest, self-efficacy, and achievement emotions. International Journal of STEM Education, 5, 43. https://doi.org/10.1186/s40594-018-0129-0

Wang, Z., Tang, S., & Sutton-Jones, K. (2019). Texas rural vs. nonrural school district student growth trajectories on a high-stakes science exam: A multilevel approach. *Social Sciences*, *8*(6), 166–185.

Weinstein, N. (2020). *Scalable implementation of learning sciences*. Mindprint Learning. https://mindprint-general.s3.amazonaws.com/Mindprint+White+Paper+v3.pdf

Wexler, N. (2020). *The knowledge gap: The hidden cause of America's broken education system-- and how to fix it*. Avery, an imprint of Penguin Random House LLC.

White House Office of Science and Technology Policy. (2013). *Federal Science, Technology, Engineering and Mathematics (STEM) Education Strategic Plan.* Available at: http://www.whitehouse.gov/sites/default/files/microsites/ostp/stem_stratplan_2013.pdf

Williams, S. (2014). *Why we need women in STEM | Inc.com*. INC. https://www.inc.com/sue-williams/why-we-need-women-in-stem.html

Widya, Ronal Rifandi, & Yosi Laila Rahmi. (2019). STEM education to fulfill the 21st-century demand: A literature review. Journal of Physics: Conference Series, 1317, 012208. https://doi.org/10.1088/1742-6596/1317/1/012208

Winfrey, O., & Angelou, M. (2015). When you know better, you do better. In *What I Know for Sure* (pp. 84–85). Farmington Hills, MI: Thorndike Press, a part of Gale, Cengage Learning.

Yeung, R., & Nguyen-Hoang, P. (2019). It is the journey, not the destination: the effect of school travel mode on student achievement. *Journal of Urbanism: International Research on Placemaking and Urban Sustainability*, 13, 170-186. https://doi.org/10.1080/17549175.2019.1626268.

Appendix A

IRB Approval to Conduct Research

LIBERTY UNIVERSITY.
INSTITUTIONAL REVIEW BOARD

November 17, 2023

Katherine McCandles
Holly Eimer

Re: IRB Exemption - IRB-FY23-24-628 STEM SMART GOAL PLANNING FOR ELEMENTARY EDUCATORS IN RURAL NORTH TEXAS: A TRANSCENDENTAL PHENOMENOLOGICAL STUDY

Dear Katherine McCandles, Holly Eimer,

The Liberty University Institutional Review Board (IRB) has reviewed your application in accordance with the Office for Human Research Protections (OHRP) and Food and Drug Administration (FDA) regulations and finds your study to be exempt from further IRB review. This means you may begin your research with the data safeguarding methods mentioned in your approved application, and no further IRB oversight is required.

Your study falls under the following exemption category, which identifies specific situations in which human participants research is exempt from the policy set forth in 45 CFR 46:104(d):

Category 2.(iii). Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording) if at least one of the following criteria is met:
The information obtained is recorded by the investigator in such a manner that the identity of the human subjects can readily be ascertained, directly or through identifiers linked to the subjects, and an IRB conducts a limited IRB review to make the determination required by §46.111(a)(7).

For a PDF of your exemption letter, click on your study number in the My Studies card on your Cayuse dashboard. Next, click the Submissions bar beside the Study Details bar on the Study details page. Finally, click Initial under Submission Type and choose the Letters tab toward the bottom of the Submission Details page. Your information sheet and final versions of your study documents can also be found on the same page under the Attachments tab.

Please note that this exemption only applies to your current research application, and any modifications to your protocol must be reported to the Liberty University IRB for verification of continued exemption status. You may report these changes by completing a modification submission through your Cayuse IRB account.

If you have any questions about this exemption or need assistance in determining whether possible modifications to your protocol would change your exemption status, please email us at irb@liberty.edu.

Sincerely,
G. Michele Baker, PhD, CIP
Administrative Chair
Research Ethics Office

Appendix B

appr'd 9/21/23
[redacted]
Superint

Superintendent
Rural Texas
Address
Texas

September 20^{th}, 2023

Dear Superintendent,

Re: Permission to conduct research at Elementary Campuses.

My name is Katherine McCandless.

I am studying for a Doctorate in Curriculum and Instruction at Liberty University. I am seeking permission to do research at (Campus C) Elementary.

I am proposing to conduct research on STEM's SMART goal planning and implementation for elementary educators in Rural North Texas districts.

The research will entail collecting data from 3^{rd}, 4^{th} and 5th-grade educators who are instructing pupils in Math, Science, or Both core subjects.
I request permission to speak to the campus staff in a focus group, conduct individual interviews, and collect responses through a questionnaire. We will meet on their assigned campus for the individual interviews and questionnaire and all together at a single campus for the focus group in person or online.
Each activity will take place before or after school hours unless requested by the participants (such as a conference period or lunch period).

The individuals from your organization will spend not more than 30 minutes to an hour on each portion of the data collection. Each participant will be asked to give their written or verbal consent before the research begins. Their responses will be treated confidentially, and identities (their names and the name of the organization) will be anonymous unless otherwise expressly indicated. Individual privacy will be maintained in all published and written data resulting from the study.

The results will be communicated and written to be addressed by the chair and committee of my dissertation in the spring of 2024.

The research participants will not be advantaged or disadvantaged in any way. They will be reassured that they can withdraw their permission at any time during this project without any penalty. There are no foreseeable risks in participating in this study as they are being conducted after contracted hours and pseudonyms are applied.

All research data will be preserved anonymously for reuse until 2028 and then destroyed along with notes, recordings, and any identifiable data.

I therefore request permission in writing to conduct my research at your organization. The permission letter should be on your organization's headed paper, signed and dated, and specifically referring to myself by name and the title of my study.

Please let me know if you require any further information. I look forward to your response.

Yours sincerely,

Katherine (Kate) McCandless

Number
Texas
[redacted]

Appendix C

Information Sheet

Title of the Project: STEM SMART GOAL PLANNING FOR ELEMENTARY EDUCATORS IN RURAL NORTH TEXAS: A QUALITATIVE STUDY

Principal Investigator: Katherine McCandless, Doctoral Candidate, School of Education, Liberty University

Invitation to be Part of a Research Study

You are invited to participate in a research study. To be eligible for participation in this study, candidates must meet the following criteria:

1. Be at least 18 years old.
2. Teaching in a rural public school in the Texas panhandle.
3. Currently teach Math, Science, or both content in grades 3rd, 4th, or 5th.

Taking part in this research project is voluntary. Please take time to read this entire form and ask questions before deciding whether to take part in this research project.

What is the study about, and why is it being done?

The primary purpose of this research is to describe and gain a deeper understanding of the challenges, successes, implementation, and planning strategies of educators with STEM-based SMART goal planning. Through exploring an educator's unique perspectives, I aim to describe the factors that contribute to successful planning and implementation. The honest feedback about the abilities and content related to the Pre-STEMs area allows insight into the state of elementary education in the core subject matter. The insights gained from this study will help inform, educate, and encourage educators and administrators to create a more inclusive environment for STEM education with our students.

What will happen if you take part in this study?

If you agree to be in this study, I will ask you to participate in the following:

1. **Online Questionnaire:** You will be invited to participate in an asynchronous questionnaire. This platform will allow you to share your experiences, challenges, and strategies related to Math, Science, or simultaneous subjects. The feedback will be open-ended, should take no more than 30 minutes, and can be completed from a desktop or other electronic device. As a participant, you can also ask questions, provide feedback, or share related experiences.

2. **Online or in-person Personal Interview:** You will have the opportunity to engage in a one-on-one audio-recorded online or in-person interview in the comfort of your classroom. The interview will be conducted via Microsoft Teams or in person, depending on your availability, and will last approximately 15-30 minutes. During the interview, you will have the chance to provide in-depth insights into your experiences, educational journey, and factors that have contributed to your Math/Science implementation. I am looking to understand better how we are or are not preparing students for STEM studies in the future based on curriculum, assessment, and planning/implementation of the core subjects.

3. **Focus Group:** You will be invited to participate in an audio-recorded in-person or online focus group discussion lasting 20-45 minutes with a small group of about 3-6 individuals who share similar experiences. The focus group will provide an opportunity to exchange ideas, compare experiences, and explore common themes related to your core subject and/or common grade level.

How could you or others benefit from this study?

By participating in this study, you will have the opportunity to share your unique insights and experiences, which can contribute to enhancing the understanding of the factors that affect the rural student in their attempt to pursue STEM's education in education and future careers.
Benefits to society include contribution to the development of targeted interventions, educational support strategies, and program improvements, benefiting future students facing similar challenges.

What risks might you experience from being in this study?

The expected risks from participating in this study are minimal, which means they are equal to the risks you would encounter in everyday life.

How will personal information be protected?

The records of this study will be kept private. Published reports will not include any information that will make it possible to identify a subject. Research records will be stored securely, and only the researcher will have access to the records.

- Participant responses will be kept confidential through the use of numerical pseudonyms. Interviews will be conducted in a location where others will not easily overhear the conversation.
- Data will be stored on a password-locked computer and may be used in future presentations. After five years, all electronic records will be deleted.
- Interviews and focus groups that are recorded via Microsoft Teams and transcribed by me. Recordings will be stored on a password-locked computer for three years and then erased. Only the researcher will have access to these recordings.
- Confidentiality cannot be guaranteed in focus group settings. While discouraged, other members of the focus group may share what was discussed with people outside of the group.

- **How will you be compensated for being part of the study?**

- Participants will be compensated for participating in this study. At the conclusion of the participants' activity study, participants will receive **a $20 gift card.**

Is study participation voluntary?

Participation in this study is voluntary. Your decision on whether to participate will not affect your current or future relations with (District D). If you decide to participate, you are free not to answer any question or withdraw at any time without affecting those relationships. Participation in the research study will not be reported or shared with the district without consent from the participant.

What should you do if you decide to withdraw from the study?

If you choose to withdraw from the study, please contact the researcher at the email address/phone number included in the next paragraph. Should you choose to withdraw, data collected from you, apart from focus group data, will be destroyed immediately and will not be included in this study. Focus group data will not be destroyed, but your contributions to the focus group will not be included in the study if you choose to withdraw.

Whom do you contact if you have questions or concerns about the study?

The researcher conducting this study is Kate McCandless. You may ask any questions you have if you have questions later, **you are encouraged** to contact her at [redacted]
You may also contact the researcher's faculty sponsor, Holly Eimer, at [redacted]

Whom do you contact if you have questions about your rights as a research participant?

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher, you are encouraged to contact the Institutional Review Board, 1971 University Blvd., Green Hall Ste. 2845, Lynchburg, VA 24515, or email at irb@liberty.edu.

Disclaimer: The Institutional Review Board (IRB) is tasked with ensuring that human subjects research will be conducted in an ethical manner as defined and required by federal regulations. The topics covered and viewpoints expressed or alluded to by student and faculty researchers are those of the researchers and do not necessarily reflect the official policies or positions of Liberty University.

Your Consent

By signing this document, you are agreeing to be in this study. Make sure you understand what the study is about before you sign. You will be given a copy of this document for your records. The researcher will keep a copy with the study records.

The study I am participating in is titled:
STEM SMART GOAL PLANNING FOR ELEMENTARY EDUCATORS IN RURAL NORTH TEXAS

If you have any questions about the study after you sign this document, you can contact Kate McCandless (Kmccandless1@liberty.edu).

I have read and understood the above information. I have asked questions and have received answers. I consent to participate in the study.

☐ The researcher has my permission to audio-record me as part of my participation in this study.

____
Printed Subject Name

____
Signature & Date

Pseudonym assigned:

Hello [Potential Participant],

As a graduate of the School of Education at Liberty University, I am conducting research to better understand STEM SMART goal setting in the elementary classroom. The purpose of my research is to better understand and describe the planning of STEM SMART goals in the Math and Science content areas, and if you meet my participant criteria and are interested, I would like to invite you to join my study.

Participants must be currently teaching in the 3rd, 4th, and 5th grades AND teach Math, Science, or both in their current classrooms.
Participants, if willing, will be asked to discuss and share in an in-person or online focus group, individual interview, and an online questionnaire. It should take approximately 60-105 minutes to complete the procedures listed above. Names and other identifying information will be requested as part of this study, but the information will remain confidential through the use of numerically assigned pseudonyms.

Would you like to participate?
[Yes]
Great, could I get your email address so I can send you the link to the survey? Or would you mind completing this survey and returning it the following email: kmccandless1@liberty.edu
[No] I understand. Thank you for your time.

Participants who complete the data collections (focus group, interview, and questionnaire) will receive a gift card in the amount of $20.00.

Thank you for your time. Do you have any questions?

Dear Educator

I am excited to share with you an opportunity for feedback about your planning and implementation in the area of Math or Science. I know you have dedicated your time, effort, and energy to the development of a strong foundation for your students in 3rd,4th, or 5th grade. As a graduate of the School of Education at Liberty University, I am conducting research to better understand STEM SMART goal setting in the elementary classroom.

I am working on research in the area of STEM SMART goal planning, setting, and implementation for educators in 3rd, 4th, and 5th grade. You fit the criteria based on your grade level and core content subject to be a part of my study. The study will be 60-100 minutes before, or after school for an online or in-person focus group and interview, as well as an online questionnaire. At the conclusion of the data collection, there is a **$20.00** financial thank you in the form of a gift card for your personal use.

I desire to get feedback about your ability to plan and implement in your core subjects. Your subject is contributing to the foundational knowledge of STEM education at the elementary and secondary levels. Your voice is valuable, and your lived experience, whether positive or negative, is necessary for effecting change in our rural community.

I would like to understand better the reason our students are struggling. I would also like to be better informed on professional education and access to material and content for you as educators. Finally, I want to understand and be able to describe the planning and implementation that is required in goal setting without students and educators in our Math and Science education.

The district has given me permission to conduct research; however, is not connected to nor will receive results until the release of my dissertation. Due to the nature of the study and the size of the rural districts participating, I will assign numerical pseudonyms to any participant for all feedback to remain confidential. You will also have a chance to review the research and results before they are written into the study. Additionally, you may choose to withdraw at any stage of the study, and your input and contributions will be destroyed.

I appreciate your consideration of the project and look forward to your response.

Thank you for all you do for our students.

Kate McCandless

Kmccandless1@liberty.edu

832-349-5308

Appendix D

Data Collection Resources

Individual Interview Questions

1. Tell me a little about the students you teach.
2. What are your favorite things about teaching(subject)at the (grade) level?
3. What is the biggest challenge about teaching (subject) at the (grade) level?
4. What makes teaching in a rural setting different from teaching in a suburban/urban setting?
5. How do you teach students to use and reach milestones in their classroom?
6. How do your prior teaching experience and beliefs with SMART goals influence your planning in your teaching practice?
7. How does improving your knowledge of SMART goal planning & implementation influence your teaching?
8. How can educators assess the quality and effectiveness of SMART goal planning in the classroom?
9. What successes have you seen in integrating SMART goals into your teaching practices or classroom?
10. How do you, as educators, improve learning outcomes and instruction through SMART goals in the large group setting? Small group? One-on-one?
11. How do you redefine a SMART Goal when not meeting the goal?
12. How do you change/tailor goals to meet your student's learning needs in __ grade?
13. How do you change/tailor goals to meet the state standards for expected learning in __ grade?
14. What resources are available to further your teaching progression in your district?
15. What resources are unavailable to further your teaching progression in your district?

16. What else would you like to contribute to this study?

Focus Group Questions

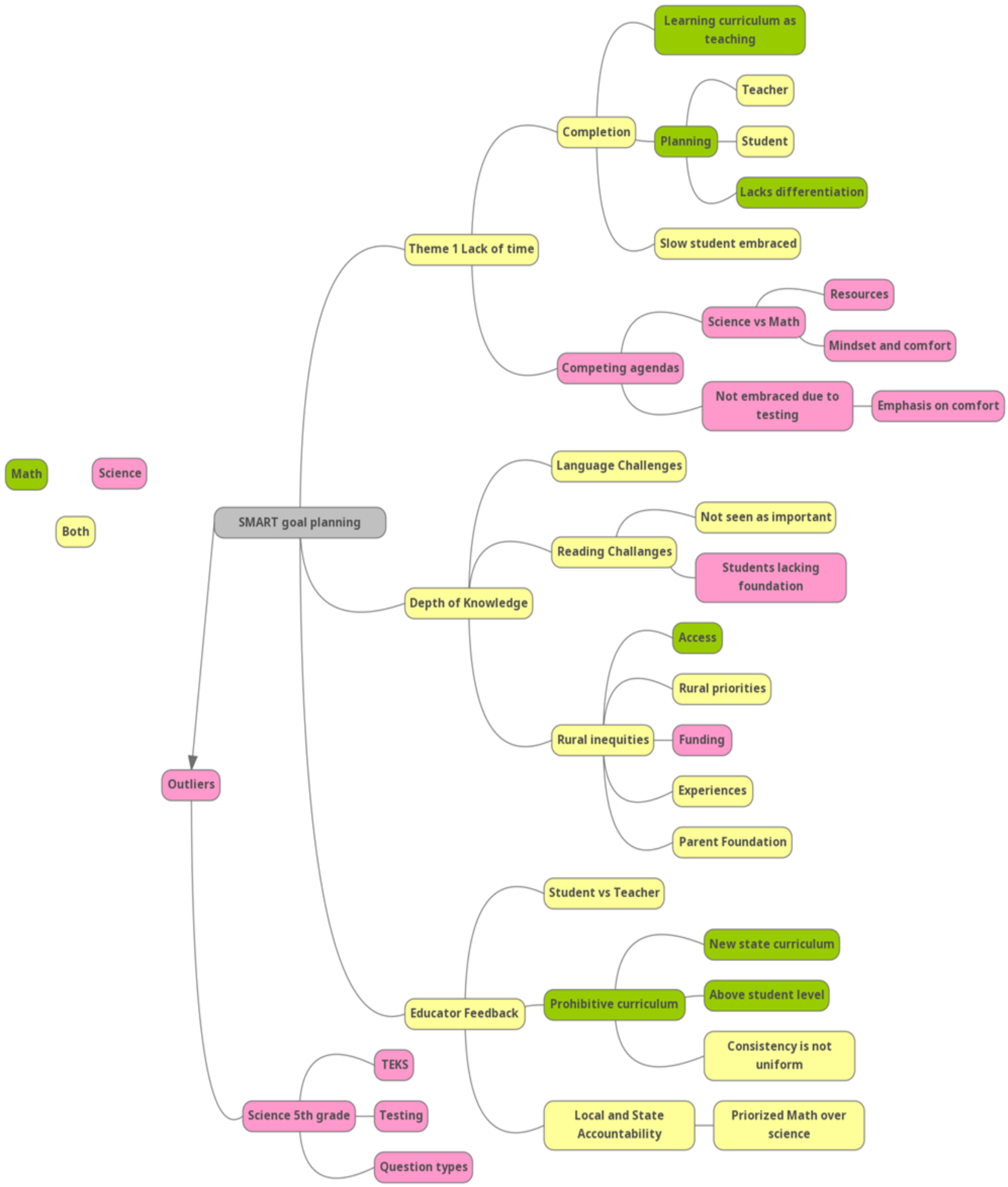
1. How is your year going in teaching (insert) grade?
2. What strategies do you, as an educator, currently use to enhance student learning?
3. What is your experience with goal setting at the classroom level? Professional level?
4. How do you feel implementing SMART goals is going in your classroom?
5. What is the perceived benefit of using SMART goals in your (Math/Science/both) classroom?
6. What challenges do educators face when integrating SMART goals into instruction, and how do they overcome these challenges?
7. What teaching strategies do you use to refine and improve the implementation of SMART goals in your classroom?
8. How long have you taught in a rural setting?
9. What other teaching experience have you had?
10. To what effect does the rural setting have on SMART goal planning and implementation?

Questionnaire Questions

1. What was your most tremendous success in your classroom this year?
2. What was your greatest challenge in your classroom this year?
3. What led you to start learning about SMART goals?
4. How do educators' perspectives of SMART goal effectiveness influence their planning and implementation in the classroom?
5. What are the challenges of using SMART goals in your (Math/Science/both) classroom? (Only educators teaching both subjects)
6. What are the challenges to fully integrating SMART goals in your classroom?
7. What is the benefit of teaching in a rural setting?
8. What challenges have you faced teaching in the rural setting?
9. What challenges do your students face in the rural education setting?
10. What benefits do your students face in the rural education setting?
11. How do you describe clarity in planning STEM SMART goals?
12. How do you describe a challenge in planning STEM SMART goals?
13. How do you describe the complexity of planning STEM SMART goals?
14. How do you describe commitment & feedback in planning STEM SMART goals?
15. Rank the items most prohibited to in-class implementation of SMART Goals (Professional Training, in-class time, out-of-school influences, student behavior, student performance, curriculum, state and district testing)
16. What additional information would you like to share about SMART Goals or implementation I did not cover that would be beneficial to consider?

Appendix E

Theme Coding



Appendix F

Sample Transcripts-Focus group

What challenges do educators face when integrating SMART goals into instruction, and how do they overcome these challenges?

Participant 14: <u>08:18</u> I mean, I am, I'm gonna go on what 13 said a second ago. It's the data piece that is really pretty challenging. And for science, the data piece is different, I think, than it is for math and reading because we don't have a past reference moving in. Um, and that makes it a little harder to even know where to grow from, from where they start.

Participant 13: <u>08:51</u> I also think that, like the STAAR, like they keep changing it too, you know? And so like, like, we're not even, like, we're sitting here teaching all these SCs and we're using like past test questions to give us ideas on how to break it down and do all this stuff. But then we've also seen how they're gonna change it into science sets, which I think is an entirely different way of giving them a test. So, like, so far, we've just given them random questions, but we've seen a test the TEA put out that was in science sets. So if they turn around benchmarks and give them in sets, the kids have never seen it. And that's a totally different way of processing through something. And it's not just like, oh, this question, if I don't get it, it's gonna be fine. I'm gonna go to another one. It's like, no, if you don't understand the picture, you're about to miss seven questions. Mm-Hmm. So, I think that it's very difficult to show growth because we can give this benchmark, but then if they interim's aan entirely different type test, you can't compare this benchmark data to a completely different test benchmark data.

Participant 12: <u>09:48</u> And science is also very difficult. 'cause like, like participant 14 said, like, we don't have like a, a content that builds on each other. It's like each unit is its own thing. Mm-Hmm. It's own, it's new, it's like you start over, and there's no building on it. Um, whereas like math, you know, like you start like with addition, and you add multiplication, then you add, like, you just keep going in steps and eventually like it spirals together. Whereas science does spiral, but it could be like the stuff that they're learning in fifth grade won't come back up to bio until

		biology. So like, or even seventh grade, they go back up into seventh grade. Well, with the SCS
Participant 13:	10:24	New SCS,
Participant 12:	10:25	Not with these new SCS. So basically, they're never gonna use it again.
Participant 13:	10:30	No. I mean some, truly. Some of it's like till, till high school until high school. Okay.

Appendix G

Interview Sample

How do you teach students to use and reach milestones in their classroom?

Participant 17 They know what their goal is. And so I do a lot of stuff like that. Um, I also do on their standardized testing, we do, um, NWA maps tests. I don't know if you're familiar with that. So since they're tested three times throughout the year, um, I actually showed them there, what they ended second grade on, and we wrote that, and I asked them to make a prediction about what they thought they could do now that they're in third grade. So they made some predictions, and some of them were right, some of them were, some of them did so much better, some of them did a lot worse. And so I used that as, as a starting point, but also to show them that it's okay for predictions to be wrong. It's okay to not meet that goal, but let's now make a plan for how you can meet your goal next time.

Appendix H

Questionnaire Sample

How do you describe the complexity of planning STEM SMART goals?

Participant 17: Complexity: the depth and difficulty level of something. Using goals in planning tends to make my planning easier because it gives me a framework that has a what, why, how, and when. What are we learning, and why are we learning it? How will we learn it, or what will the finished product be? How will we know we learned it successfully? When will we learn this by? For me the lesson planning process becomes less complex but the plans themselves are more complex and student centered.

Appendix I

Audit Trail

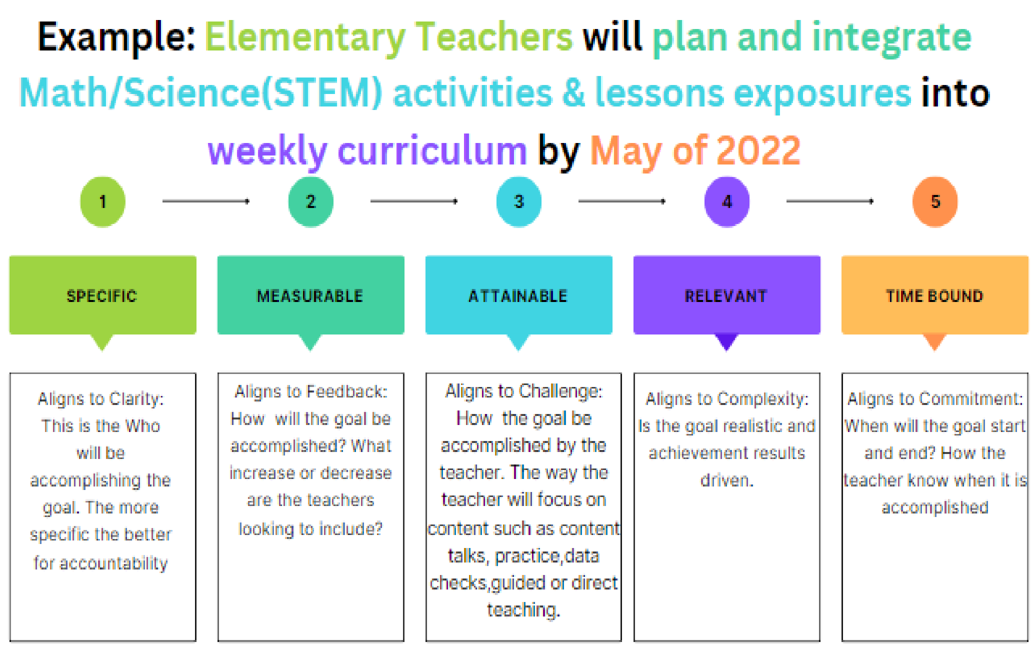
Pseudonym	Content Area	Grade Level	Consent obtained	Focus group date	Interview date	Questionnaire received	Incentive paid
1	Math	4th & 5th	Written		1/3	1/3	x
4	Math	4th	Verbal		12/20	1/31	x
5	Math	3rd	Verbal		12/21	12/20	x
6	Science	4th	Written		1/29	1/29	x
11	Math	3rd	Written		1/17	1/12	x
12	Science	5th	Verbal	1/11	1/11	1/20	x
13	Science	5th	Verbal	1/11	1/11	1/31	x
14	Science	5th	Verbal	1/11	1/11	1/23	x
17	Math/Science	3rd	Written		1/12	1/12	offered
20	Math	4th	Verbal		12/21	12/20	x
22	Science	5th	Withdrew	1/11	1/11		

Appendix J

Locke and SMART Goal Alignment

Figure 1

Locke & SMART Goal Alignment



Adapted from Ertmer et al., 2018; Locke &Latham, 2019