

Gardner-Webb University

## Digital Commons @ Gardner-Webb University

---

Doctor of Education Dissertations

College of Education

---

Summer 2022

# Lay it All on the Line: The Effect of Teacher-Student Conferencing in Middle Grades Mathematics Classrooms

Natalie Ostrander

Gardner-Webb University, [nostrander@gardner-webb.edu](mailto:nostrander@gardner-webb.edu)

Follow this and additional works at: <https://digitalcommons.gardner-webb.edu/education-dissertations>



Part of the [Educational Methods Commons](#), [Science and Mathematics Education Commons](#), and the [Secondary Education Commons](#)

---

### Recommended Citation

Ostrander, Natalie, "Lay it All on the Line: The Effect of Teacher-Student Conferencing in Middle Grades Mathematics Classrooms" (2022). *Doctor of Education Dissertations*. 104.  
<https://digitalcommons.gardner-webb.edu/education-dissertations/104>

This Dissertation is brought to you for free and open access by the College of Education at Digital Commons @ Gardner-Webb University. It has been accepted for inclusion in Doctor of Education Dissertations by an authorized administrator of Digital Commons @ Gardner-Webb University. For more information, please see [Copyright and Publishing Info](#).

LAY IT ALL ON THE LINE: THE EFFECT OF TEACHER-STUDENT  
CONFERENCING IN MIDDLE GRADES MATHEMATICS CLASSROOMS

By  
Natalie Smith Ostrander

A Dissertation Submitted to the  
Gardner-Webb University College of Education  
in Partial Fulfillment of the Requirements  
for the Degree of Doctor of Education

Gardner-Webb University  
2022

## Approval Page

This dissertation was submitted by Natalie Smith Ostrander under the direction of the persons listed below. It was submitted to the Gardner-Webb University College of Education and approved in partial fulfillment of the requirements for the degree of Doctor of Education at Gardner-Webb University.

---

James Palermo, EdD  
Committee Chair

---

Date

---

Michelle Bennett, EdD  
Committee Member

---

Date

---

Jeanne Swafford, PhD  
Committee Member

---

Date

---

Prince Bull, PhD  
Dean of the College of Education

---

Date

## **Acknowledgements**

For every student who has ever told me they hated math and/or were not good at math, this is for you. For every student who has asked me “when will I use this in life,” this is for you. Over the years, my passion and inquiry for math instruction have significantly been shaped, modified, and reshaped again, with each experience and person tucked in my memory. I am forever grateful for the never-ending support throughout my life and career from so many educators, colleagues, friends, and family. A special thanks to Jodi M. and Lisa S. for always being my rainbows on rainy days.

First, I am extremely grateful to my teacher participant, the one who said yes and carried through, especially in such a stressful and trying time for teachers. I cannot thank you enough for your dedication, willingness, and positivity. Also, I would like to express my deepest appreciation to each member of my committee. Your extensive knowledge, valuable feedback, and commitment to my research have ignited my love for education and instruction even more.

Finally, to my husband Simon, thank you for the nudges, understanding, sacrificing time apart, taking care of our child when I had class or was busy with writing, and for your love through it all...done, finally!

Thanks be to God.

## **Abstract**

### **LAY IT ALL ON THE LINE: THE EFFECT OF TEACHER-STUDENT CONFERENCING IN MIDDLE GRADES MATHEMATICS CLASSROOMS.**

Ostrander, Natalie Smith, 2022: Dissertation, Gardner-Webb University.

Increasing math achievement continues to be a commonly talked about subject in the educational setting. This case study observes one classroom teacher who implemented teacher-student conferencing in middle grades mathematics classes. The purpose of this study was to reveal the perceived impact of teacher-student conferencing on student engagement and with student achievement. Through a qualitative approach, perceptual data were collected through teacher journaling, conference logs, observations, and an interview. Research occurred in one school district in southeastern North Carolina with middle grades students in sixth and eighth grades. After the qualitative data were collected by me, data were analyzed using predetermined codes and Dedoose data analysis software. The results revealed that teacher-student conferencing influences both student engagement and student achievement. The teacher participant noted positive benefits as a result of conferencing with students.

*Keywords:* achievement, conferencing, engagement, mathematics, middle grades, teacher-student conferences

## Table of Contents

	<b>Page</b>
Chapter 1: Introduction .....	1
Statement of the Problem.....	3
Research Questions .....	7
Limitations of Study .....	8
Delimitations of Study .....	9
Assumptions.....	9
Definition of Terms.....	9
Summary .....	11
Chapter 2: Literature Review.....	12
Introduction.....	12
Theoretical Framework .....	12
Review of Research .....	28
Additional Literature.....	34
Summary .....	47
Chapter 3: Methodology .....	48
Introduction to Methodology .....	48
Research Design .....	49
Participants.....	50
Distance Learning .....	54
Instrumentation .....	56
Data Collection .....	58
Data Analysis .....	59
Validity and Reliability.....	60
Summary .....	62
Chapter 4: Results .....	63
Introduction.....	63
Description of Sample.....	64
COVID-19.....	64
Summary of the Qualitative Findings .....	65
Detailed Analysis of Qualitative Findings.....	67
Student Engagement .....	67
Student Achievement .....	77
Emergent Themes .....	86
Triangulation.....	88
Summary .....	88
Chapter 5: Discussion .....	89
Summary of Study .....	89
Interpretations of Findings.....	90
Limitations of Study .....	95
Delimitations of Study .....	96
Suggestions for Future Studies .....	97
Conclusions.....	99
References .....	101

## Appendices

A	NC State Testing Results .....	105
B	Barometer of Influence .....	107
C	High Impact Approaches .....	109
D	NCTM Mathematics Teaching Practices .....	111
E	Initial Teacher Participant Email .....	113
F	Observation Protocol Form.....	115
G	Types of Conference Teacher Handout .....	117
H	Conference Log.....	120
I	Predetermined Code List.....	122
J	Interview Protocol Questions.....	124

## Tables

1	Structure of a Guided Math Conference .....	25
2	Types of Guided Math Conferences .....	27
3	Research Study Descriptions .....	28
4	NCTM Guiding Principles for School Mathematics .....	41
5	Characteristics of Effective Feedback .....	46
6	Setting Descriptions .....	50
7	Research Participants .....	51
8	Process Timeline .....	58
9	Predetermined Code List.....	66
10	Engagement Teacher Quotes .....	68
11	Action Verbs Related to Engaged Behavior from Teacher Quotes .....	69
12	Researcher Notes .....	70
13	Researcher Engaged Behavior Notes.....	71
14	Researcher Engaged Emotion Notes.....	72
15	Engaged Conference Log Notes .....	74
16	Behavior Conference Log Notes.....	75
17	Engaged Teacher Quotes .....	76
18	Achievement Teacher Quotes .....	78
19	Observation Student Achievement Data.....	81
20	Achievement Conference Log Notes .....	82
21	Student Achievement Conference Log Notes.....	83
22	Student Achievement Teacher Quotes.....	85
23	Vocabulary Teacher Quotes.....	86
24	Student Confidence Teacher Quotes.....	87

## Figures

1	North Carolina NAEP Mathematics .....	4
2	Utilizing Conferencing Data as Formative Assessments.....	20

## Chapter 1: Introduction

You do not have to work a certain job or go to college to experience learning mathematics in some shape or form. For the most part, people experience mathematics all throughout growing up. Can you think back to the last time you were in math class? Some people do not consider themselves a mathematician, yet they have experienced numerous years of hearing, seeing, and talking mathematics. What would those encounters look like? Often people, especially students, can be quite vocal about their experiences with math, whether it is good or bad; however, are students presented the chance to share their thoughts?

How would you predict students from the United States perform in mathematics compared to international students? You do not even have to be an education expert to find answers. Here are just a few headings that rapidly appear after a quick search on the web: “Why U.S. students are bad at math” (Venezky, 2018), “Math scores stink in America. Other countries teach it differently—and see higher achievement” (Richards, 2020), and “Why so many U.S. students aren’t learning math” (Wolpert, 2018). Article after article blasts the issue of math achievement with American students and how they compare to other countries or lag in placement. In one article, Richards stated,

Classes here often focus on formulas and procedures rather than teaching students to think creatively about solving complex problems involving all sorts of mathematics, experts said. That makes it harder for students to compete globally, be it on an international exam or in colleges and careers that value sophisticated thinking and data science. (para. 4)

Think big and imagine 64 countries administering an international assessment



known as the Programme for International Student Assessment (PISA) in 2015 and 2018.

Same question, where would you guess the United States performed in mathematics?

This assessment is administered every 3 years to 15-year-olds to measure what students have learned in math, reading, and science. According to Camera (2019),

The exam was developed by the OECD [Organisation for Economic Cooperation and Development], an intergovernmental organization made up of 37 mostly industrialized countries. In 2018, 79 countries administered the PISA exam to more than 600,000 students in public and private schools. (para. 4)

Of those same 64 countries that administered the assessment both years, the United States ranked 30<sup>th</sup> in mathematics, compared to eighth in reading and 11<sup>th</sup> in science (Camera, 2019). Camera (2019) stated, “Most troubling to researchers is that 30 countries scored higher than U.S. students in math and that the performance gap between top-performing and lower-performing students is widening” (para. 3). How is it that the United States has not made significant improvements in mathematics since 2003? Seventeen years later, U.S. students still lag behind their peers in most of the developed world in math achievement.

Hattie et al. (2017) even felt the importance to indicate that people who understand mathematics have a higher quality of life. The ability to understand mathematics and excel at the subject is a problem facing students in the United States. As educators, we owe it to our students to provide them with the highest quality of mathematics instruction. Students are our future.

## **Statement of the Problem**

Increasing math proficiency is a profound and commonly discussed issue throughout states, districts, schools, and among teachers. According to the National Assessment of Educational Progress (NAEP, 2021), the 2019 NAEP Mathematics Assessment reported, “mathematics scores increase at grade 4, decrease at grade 8 compared to 2017” (National & State Average Scores section) for national and state average scores. NAEP also reported between 2017 and 2019, out of 50 states, the District of Columbia, and Department of Defense schools, 43 states/jurisdictions, including North Carolina, had no significant change in score (NAEP, 2021).

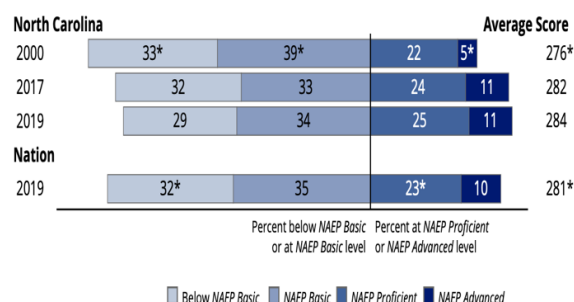
When narrowing the focus to North Carolina, NAEP also reported for Grade 8 mathematics, “The percentage of students in North Carolina who performed at or above the NAEP Proficient level was 37 percent in 2019. This percentage was not significantly different from that in 2017 (35 percent)” (NAEP, 2021, NC Summary Statements section). A snapshot of North Carolina’s 2019 results are highlighted in Figure 1.

**Figure 1***North Carolina NAEP Mathematics***2019 Mathematics State Snapshot Report**

North Carolina ■ Grade 8 ■ Public Schools

**Overall Results**

- In 2019, the average score of eighth-grade students in North Carolina was 284. This was higher than the average score of 281 for students in the nation.
- The average score for students in North Carolina in 2019 (284) was not significantly different from their average score in 2017 (282) and was higher than their average score in 2000 (276).
- The percentage of students in North Carolina who performed at or above the *NAEP Proficient* level was 37 percent in 2019. This percentage was not significantly different from that in 2017 (35 percent) and was higher than that in 2000 (27 percent).
- The percentage of students in North Carolina who performed at or above the *NAEP Basic* level was 71 percent in 2019. This percentage was not significantly different from that in 2017 (68 percent) and was higher than that in 2000 (67 percent).

**NAEP Achievement-Level Percentages and Average Score Results**

\* Significantly different ( $p < .05$ ) from state's results in 2019. Significance tests were performed using unrounded numbers.

NOTE: NAEP achievement levels are to be used on a trial basis and should be interpreted and used with caution. Detail may not sum to totals because of rounding.

When continuing to look at North Carolina more specifically, according to the North Carolina Department of Public Instruction (NCDPI), statewide percentages show that 41% of sixth graders are not proficient, 41.5% of seventh graders are not proficient, and 64.3% of eighth graders are not proficient in mathematics (Appendix A; NCDPI, 2022a). These data were collected through North Carolina end-of-grade (EOG) tests from students in sixth through eighth grades. EOG tests are designed to gauge student performance at the end of every school year. These tests align to goals, objectives, and grade-level proficiencies through state standards in reading, mathematics, and science (NCDPI, 2022b). The following achievement levels represent EOGs scoring categories: Level 5, Level 4, Level 3, or Not Proficient. If a student performs at Level 5 or Level 4, the student is considered grade-level proficient and college and career ready. If a student

performs at Level 3, the student is considered grade-level proficient but not college and career ready. If a student performs at the Not Proficient level, the student is not considered grade-level proficient or college and career ready (NCDPI, 2022b).

Efforts are made by states and districts to address proficiency and grade-level results, but what is missing? Both national and state statistics show that math scores are low. Even James Stigler, a UCLA professor of developmental and cognitive psychology, stated during an interview, “The focus on teachers has some merit, of course, but we believe that a focus on improving of teaching—the methods that teachers use in the classroom—will yield greater returns” (Wolpert, 2018, para. 23). Are traditional instructional methods working? Are students receiving instructional strategies or best practices that promote discourse, collaboration, conceptual understanding, fluency, and problem-solving skills? Are students’ strengths, weaknesses, areas of concern, or opportunities discussed? Hattie et al. (2017) pointed out, “mathematics instruction—like any good instruction—must be intentionally designed and carefully orchestrated in the classroom, and should always focus on impacting student learning” (p. 4).

It is time to investigate math achievement in North Carolina within one district setting, and teacher-student conferencing in middle grades mathematics classrooms may be a solution. As Sammons (2014) emphasized, “Conferring individually with students, teachers are able to not only determine student strengths and needs, but also deliver specific feedback in a way that motivates students to respond in productive ways that enhance both their mathematical work and understanding” (p. 48).

According to Sammons (2014), “As demands for greater depth and rigor in mathematics education increase, the rich interactions between teachers and students as

they confer are conducive to thoughtful reflection, intellectual curiosity, and motivation for learning” (p. 58). Conferencing is an opportunity to individually meet and communicate with students about specific ideas. Sammons (2014) further elaborated by describing math conferences as one-on-one conversations with students about their math work and that it is one mathematician talking to another mathematician. The purpose of examining teacher-student conferencing is to determine whether or not it can address low math proficiency. Furthermore, Sammons (2014) stated the following:

Math conferences are a time for students to share their mathematical thinking with their teachers. In doing so, they learn not only to organize and express their mathematical ideas cogently, but also to continually reassess the validity of their reasoning. Moreover, these mathematical conversations support the learning of new concepts and strategies by requiring that students focus on representing their work, both verbally and with diagrams, models, or symbols so that it can be clearly understood by others. (p. 17)

### ***Significance of Study***

I hope to contribute to the larger discussion of improved achievement in mathematics; therefore, in an effort to address low math proficiency, this study seeks to provide stakeholders with an instructional method to improve student engagement and student achievement. According to Briars (2017), past president of the National Council of Teachers of Mathematics, “Effective teaching is the non-negotiable core of any mathematics program. As mathematics educators, we continually strive to improve our teaching so that every child develops the mathematical proficiency needed to be prepared for his or her future” (Hattie et al., 2017, p. xxi). The practice of teacher-student

conferencing has the potential to support instruction while providing added evidence for student engagement and achievement. First, formative assessment data can be gathered during the process, serving as a gauge for informing instruction. Next, not only are students provided feedback from the teacher while conferring, but the teacher also receives feedback from the students in order to further guide student learning and instruction. Finally, teacher-student conferencing delivers the opportunity for teachers to build a stronger, more positive relationship with students (Sammons, 2014). The goal of this case study was to highlight different grade-level classrooms that implemented teacher-student conferencing and analyze the impacts.

### ***Audience***

This study may benefit current mathematics teachers, but it may also benefit future middle grades mathematics teachers. Additionally, administrators, lead teachers, instructional coaches, district coordinators, and superintendents may benefit from discovering an instructional method that impacts student engagement and student achievement. Understanding the effects of teacher-student conferencing in middle grades mathematics classrooms could improve math performance within a school, district, or state and essentially impact student learning overall.

### **Research Questions**

The research questions that guided this study were

1. What is the impact (as perceived by the teacher) of teacher-student conferencing on student engagement?
2. What is the impact (as perceived by the teacher) of teacher-student conferencing with student achievement?

**Limitations of Study**

One limitation of the study was the teacher participants, all of whom were selected on a volunteer basis. Sixth-, seventh-, and eighth-grade teachers within a southeastern North Carolina school district were emailed research information, and participants were selected based on teacher interest; therefore, the number of teacher participants and what grade level they taught was out of my control. It is also important to note that through district approval of research, participants could opt out of the study at any time.

Another limitation was the age range of students. Students ranged in age between 11 years of age and 14 years of age. This age range happens to be a convenience sample for this research study.

**Delimitations of Study**

One delimitation of the study was that I selected only middle grades mathematics teachers as part of the research design. This choice was made because of my teaching experience and education licensure. I am most knowledgeable about middle grades content, state math standards, and the structure of middle schools.

A second delimitation is that the research only took place within one school district. The rationale for selecting one school district was that the district is a convenience sample. This provided an opportunity to offer district stakeholders with findings of the study.

One last delimitation of the study was that I selected Sammons's (2014) Guided Math Conferencing framework as part of the research design. I specifically chose Sammons's (2014) framework to use as a validated design for my research. I contacted

Laney Sammons and was granted permission to use the framework and specific tools.

### **Assumptions**

For this qualitative case study, there are two assumptions to be mentioned. The first assumption is that the teacher participant was authentic and truthful with all perceptual data when providing journal entries, conference logs, and answers to questions during the virtual focus interview. Secondly, it is assumed that the teacher participant actually implemented and carried out teacher-student conferences in sixth- and eighth-grade mathematics classes when I was not present in the classroom.

### **Definition of Terms**

Particular terms have been defined in order to clarify the content and purpose of the study. If a term is not accompanied with a citation, the term has been defined by me.

### ***Case Study***

A qualitative design in which the researcher explores in depth a program, event, activities, process, or one or more individuals. The case(s) are bounded by time and activity, and researchers collect detailed information using a variety of data collections procedures over a sustained period of time. (Creswell, 2018, p. 247)

### ***Conferencing***

The process of one-on-one conversations between the teacher and student that has a specific purpose.

### ***Discourse***

“The exchange of ideas, including ways of representing, thinking, talking, agreeing, and disagreeing” (Hattie et al., 2017, p. 136).



***Feedback***

Information given to students from teachers in order to reach a goal, providing positives, negatives, strengths, weaknesses, and areas for improvement.

***Formative Assessment***

“A process, one in which information about learning is evoked and then used to modify the teaching and learning activities in which teachers and students are engaged” (Black et al., 2003, p. 122).

***Guided Math***

A Sammons (2010) framework that consists of seven components: a classroom environment of numeracy, math warm-ups, whole-group instruction, small-group instruction, math workshop, math conferences, and assessment.

***Proficiency***

Consistently performing at a certain level or associated score. Proficiency is considered a Level 3, 4, or 5 on the North Carolina EOG test or by a letter grade that is determined by districts in North Carolina.

***Student Achievement***

When a student has reached a goal; attainment of expected standards, learning targets, and demonstration of growth through assessment data.

***Student Engagement***

Actively involved in one's own learning; aware of the task or activity one is participating in or completing. Students can show engagement through shaking their heads, writing, providing answers, discussing, eye contact, and tracking the teacher.

## Summary

In summary, middle grades math performance for the state of North Carolina is not exemplary. A proficiency issue has continued to occur over multiple decades. It is also apparent that middle grades math performance is not just a state problem, but also a national problem. Mathematics is real; mathematics is a way of navigating the real world and life. Hattie et al. (2017) summarized it best:

We believe that everyone can and should learn mathematics. We believe that numbers and the mathematics we use to make sense of them are amazing and beautiful. Some of the ways people have experienced mathematics instruction didn't invite them into that beautiful space. (p. 1)

This chapter provided the reader with an all-encompassing view of a problem, which then narrowed the focus to a particular state problem. The significance of the study was presented, along with two research questions, limitations, delimitations, and definitions of terms. The upcoming chapters present the literature review, the methodology behind the study, and the findings of the research, and will conclude with discussions regarding the impact of the study as well as suggestions for future studies.

## **Chapter 2: Literature Review**

### **Introduction**

This chapter is comprised of three focal parts: (a) theoretical framework; (b) review of research; and (c) additional literature. The theoretical framework outlines various theorists and their ideas supporting the notion of conferencing in mathematics classrooms. The work presented starts with a broad theory of social constructivism and continues to narrow the focus to additional detailed concepts such as Guided Math conferences. In addition to theories, research is summarized and presents specific scenarios of conferencing across different content areas and grade levels. Lastly, additional literature defines conferencing, presents components of conferencing, and states the benefits of conferencing.

### **Theoretical Framework**

#### ***Social Constructivism***

John-Steiner and Souberman (as cited in Vygotsky, 1978) stated, “teaching represents the means through which development is advanced; that is, the socially elaborated contents of human knowledge and the cognitive strategies necessary for their internalization are evoked in the learners according to their ‘actual development levels’” (p. 131). Part of Vygotsky’s (1978) theory of learning and development, while rejecting prior theories, developed the zone of proximal development (ZPD), explaining this as “the distance between the actual development level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers” (p. 86). Vygotsky’s work in psychology is still considered relevant today and informs and lays a

foundation for many beliefs about social learning. Vygotsky's work on development is especially significant for understanding how learning occurs. He continued to describe this ZPD as functions not yet matured, what he compared to "buds" or "flowers" having the capability of maturing soon. If functions are fully developed, they are thought of as "fruit" of the development (Vygotsky, 1978). Further, Vygotsky stated,

Every function in the child's cultural development appears twice: first, on the social level, and later on the individual level; first, between people (interpsychological), and then inside the child (intrapsychological). This applies equally to voluntary attention, to logical memory, and to the formation of concepts. All the higher functions originate as actual relations between human individuals. (p. 57)

Vygotsky's (1978) emphasis on the role of play, written language, and speech all support the social constructivist paradigm. With Vygotsky's proposal that play and school instruction are parallel, both create a ZPD. Also, in both contexts, this allows children to build upon socially available skills and knowledge that will be internalized (John-Steiner & Soubberman, as cited in Vygotsky, 1978). As for language, "Vygotsky presents a sophisticated argument demonstrating that language, the very means by which reflection and elaboration of experience take place, is a highly personal and at the same time a profoundly social human experience" (John-Steiner & Soubberman, as cited in Vygotsky, 1978, p. 126). Also, Vygotsky viewed speech as an "excellent example of sign usage which once internalized, becomes a pervasive and profound part of the higher psychological processes; speech acts to organize, unify, and integrate many disparate aspects of children's behavior, such as perception, memory, and problem solving" (John-

Steiner & Souberman, as cited in Vygotsky, 1978, p. 126). Finally, Vygotsky highlighted, “Thus, the zone of proximal development permits us to delineate the child’s immediate future and his dynamic developmental state, allowing not only for what already has been achieved developmentally but also for what is in the course of maturing” (p. 87).

Both Hattie et al. (2017) and Munson (2018) contributed to the idea of social constructivism, specifically with supporting mathematics learning. Hattie et al. proposed that good mathematics learning is embedded in discourse and collaboration between teachers and peers. Discourse and collaboration should be coordinated around appropriately challenging tasks, and students should be thinking and talking more than the teacher. In addition, it is proposed that students own their learning and should be partners in understanding with metacognition in order to evaluate where they are going, how they are doing currently, and where to go next (Hattie et al., 2017). These ideas align and may be compared with Vygotsky’s (1978) ideas of interpsychological and intrapsychological social and individual development.

Hattie et al. (2017) also put forward that high-quality math lessons involve student collaboration. Hattie et al. suggested that teachers attend to social learning intentions that “focus on the social skills that foster effective collaboration and communications” (p. 51) and that the ways in which peers interact with one another, as well as their teacher, “are an engine in the classroom” (p. 51). Munson (2018) also proposed mathematics is a social act yet clearly described her ideas in relation to conferring in mathematics. Munson wrote,

Math, for instance, is a social act: students work together, in pairs and small groups, to solve problems and build understanding. So, conferring in math

involves the teacher stepping into this social mathematical space to support the learning, communication, and participation of all partners. In math, children are solving problems, and the journey to a solution is more valuable than the destination. So, conferring in math must position the teacher along-side students on their pathway, rather than as the beacon at the end of the trail guiding them home. (p. xix)

### ***Feedback***

Almarode et al. (2019) emphasized the importance of feedback to learners being specific and constructive so learners can integrate the feedback into their own thinking. Hattie's (2009) database is composed of over 1,800 meta-analyses of studies that include over 80,000 studies and 300 million students in what is best known as Visible Learning. The Visible Learning database is considered the largest educational research database, aiming to understand what works best for learning with the highest impact of influence (Almarode et al., 2019). It is important to understand that the mathematical tool used to aggregate the data produces an effect size, which helps reveal the impact of influence an approach has on learning (Almarode et al., 2019). An effect size greater than 0.40 creates a zone of desired effects (Appendix B). As reported, feedback produces an effect size of 0.70 (Appendix C). Hattie also added that the effect size of 0.40 creates a level where the effects of change improve achievement in a manner where you begin to notice real-world differences and that this particular level should be a target for real-world change.

Feedback may serve purposes for the student and the teacher. When the teacher is formatively evaluating students or checking for understanding, feedback is used as a tool for moving learning forward. Teachers gain feedback on the effectiveness of instruction

and are then able to turn around and provide students feedback (Hattie et al., 2017). As stated, “Formative evaluation is about gathering real-time data about where students are in the learning process, and it is critical to making good decisions about instruction” (Hattie et al., 2017, p. 201). This real-time feedback allows the teacher to constantly gauge instruction and make appropriate instructional adjustments.

Feedback provided to the student in order to adjust their learning falls into four levels: (a) feedback about the task; (b) feedback about the process; (c) self-regulatory feedback; and (d) feedback about self (Hattie et al., 2017). Levels 1 and 2 are most often used in the classroom by teachers when students are working on a task or process; however, Level 3 is most crucial for transfer of learning (Hattie et al., 2017). It is stated,

Effective teachers look for opportunities to give feedback to students by playing back what occurred.... It also acknowledges to the student that you are listening to what he is doing—and such respect is typically welcomed, builds trust, and leads to student realizing that the feedback is just for them. (Hattie et al., 2017, pp. 205-206)

When teaching for the application of concepts and thinking skills, it is important to guide and scaffold student thinking. When doing so, the learners’ responses to teacher questions act as feedback on both the quality of the question and the students’ levels of understanding (Almarode et al., 2019). It is also stated that teachers must use feedback from students, such as their conversations and actions, to adjust instruction and the direction of where to go next (Almarode et al., 2019).

Lastly, Almarode et al. (2019) discussed effective feedback as a crucial characteristic of the Visible Learning mathematics classroom. Further, mastery learning

was introduced and described as the presumption that learners will grasp conceptual understanding, procedural understanding, and/or the application of certain concepts and thinking skills (Almarode et al., 2019). Mastery learning also presented specific features of (a) clear learning expectations; (b) feedback that is specific, constructive, and timely; and (c) sufficient time, attention, and support to ensure learning (Almarode et al., 2019). The idea of mastery learning help supports the effect of effective feedback. The idea of mastery learning may be compared to the idea of proficiency and student achievement. If a student is consistently performing at a certain score or level and accomplishing goals towards learning targets, they have grasped specific conceptual understanding, procedural understanding, and the application of the concept, as suggested by Almarode et al.

It is suggested that one of the most applicable strategies a teacher can use is providing feedback to students. It is a tool for teachers to inform students and improve how well they are doing (Marzano et al., 2001). Their research and proposal of research-based strategies that increase student achievement list providing feedback as part of their nine strategies. Their work also provided four generalizations to aid in the use of feedback. These generalizations include (a) feedback should be “corrective” in nature; (b) feedback should be timely; (c) feedback should be specific to a criterion; and (d) students can effectively provide some of their own feedback (Marzano et al., 2001).

### ***Assessment***

Earl (2013) acknowledged that assessments do not stand alone from the daily routines of teachers throughout their day. Teachers are constantly assessing what students know and challenge student thinking. Earl introduced the ideas of assessment of learning, for learning, and as learning as contributors to the role of assessment within the



classroom. Assessment for learning allows teachers to use a wide variety of data for different purposes so modifications can be made for learning, as well as crafting assessment tasks in the middle of learning that open a window for next steps in instruction for their students (Earl, 2013). Assessment as learning emphasizes using assessment as a means of developing and supporting metacognition for students, as well as focusing on the role of the student being the connector between the assessment and their learning (Earl, 2013). Furthermore, Earl claimed the following:

It [metacognition] occurs when students personally monitor what they are learning and use the feedback from this monitoring to make adjustments, adaptations, and even major changes in what they understand. When teachers focus on assessment as learning, they use classroom assessment as the vehicle for helping students develop and practice the necessary skills to become critical thinkers who are comfortable with reflection and the critical analysis of their learning. (p. 28)

Assessment of learning has a purpose of being summative, where grades are given and recorded, and where the teacher creates the test to determine which students did well and which ones did not. Often, this type of assessment is used to rank students based on achievement and position students within groups. Assessment of learning tends to be more about marks and grades rather than directions for improvement or mastery of concepts (Earl, 2013).

Earl (2013) also presented the idea of using assessment to motivate learning. He emphasized that “when students feel ownership and have choice in their learning, they are more likely to invest time and energy in it. Assessment can be a motivator, not

through reward and punishment, but by stimulating students' intrinsic interest" (Earl, 2013, p. 78). It is also suggested that motivation is increased when mistakes and errors are treated as a normal part of learning with appropriate feedback that allows the student the opportunity to rethink and redo in order to stay engaged with the task (Earl, 2013).

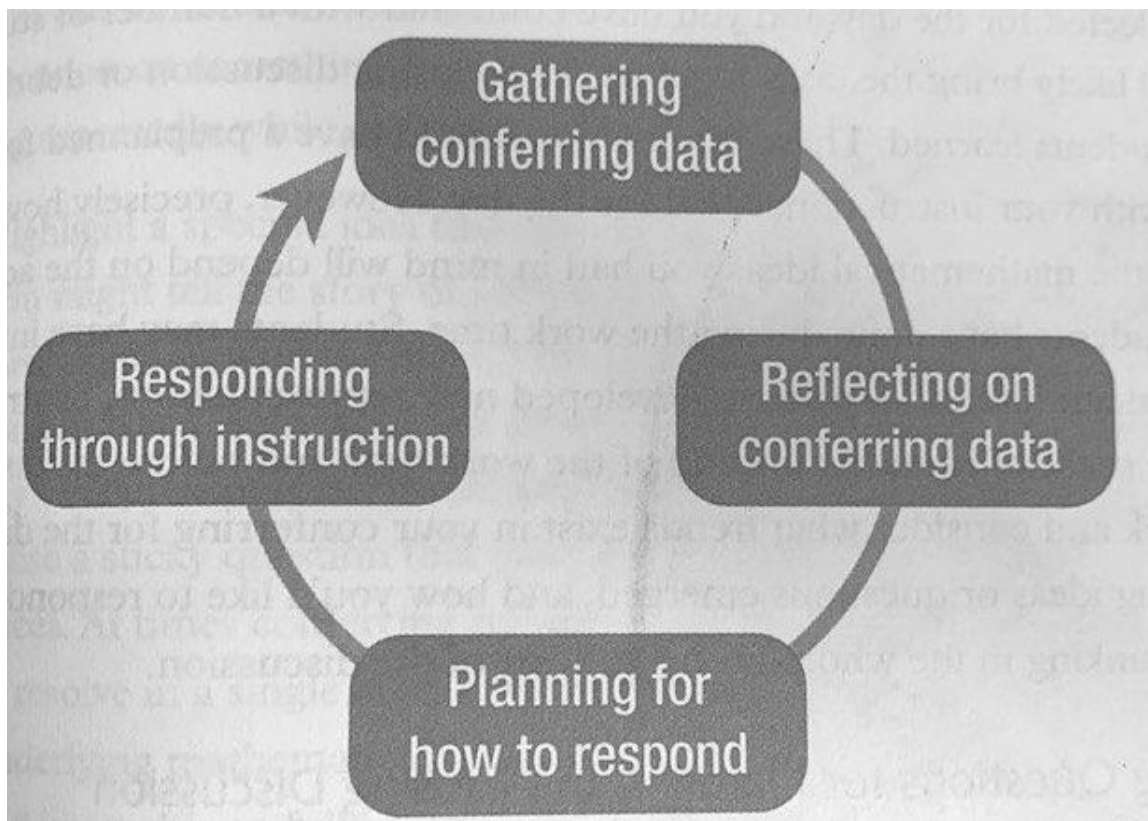
Black et al. (2003) stated, "An assessment activity can help learning if it provides information to be used as feedback by teachers, and by their students in assessing themselves and each other, to modify the teaching and learning activities in which they are engaged" (p. 2). It is also suggested that formative assessment can occur many times throughout a lesson, as well as involve a variety of methods that encourage students to express what they are thinking and how to show it (Black et al., 2003).

Another idea presented is that information about learning gained from assessments designed to produce information should not be used for recording purposes or long-term improvement. If used in this manner, it does not benefit students but only becomes formative for the teacher (Black et al., 2003).

Munson (2018) stated, "But the conferences we have with students are formative assessment, too. Indeed, conferring is formative assessment at its most immediate, relevant, and useful, because we can act on what we learn immediately in the nudge" (p. 100). Munson also provided teachers with a simple yet powerful visual, Figure 2, of how to use conferencing data as formative assessments.

**Figure 2**

*Utilizing Conferencing Data as Formative Assessments*



With these four key stages as a guide, teachers can understand how to use conference data as formative assessments. Record keeping can play an important role in organizing and utilizing conference data. Munson (2018) further elaborated that keeping records of conferring helps teachers respond to what they have learned and how learning reveals itself over time, as well as supporting instructional decisions.

In addition to the research with formative assessment, an idea of self-assessment emerges. Even though teachers hold the primary responsibility for assessing students and providing feedback, a shift begins to occur away from the idea of knowledge transmission from teacher to student, to a process of the student constructing their own knowledge (Sammons, 2014). Through a reflective process of self-assessment, students

are able to develop a deeper understanding of the purposes of their learning and actively examine and self-regulate their learning, as well as what is needed to be successful (Sammons, 2014). In order to self-assess, students must be aware of the purpose behind their work, learning expectations, success criteria, standards being studied, and strategies for repairing comprehension. Another important aspect of self-assessment is the idea of personal learning goals. This allows students to monitor their progress towards meeting a certain target, as well as critically view their work and mathematical comprehension (Sammons, 2014).

Self-assessment can be fostered through the use of modeling and one-on-one meetings that include the teacher and the student. Modeling can include questioning, thinking, and vocabulary. Having one-on-one conversations with students teaches students how to assess their own work. When teachers provide descriptive feedback to the student, it models for the student the way they should think about their own work independently (Sammons, 2014).

### *Relationships*

As Hattie (2009) presented, “Building relations with students implies agency, efficacy, respect by the teacher for what the child brings to the class (from home, culture, peers), and allowing the experiences of the child to be recognized in the classroom” (p. 118). From Hattie’s meta-analyses work and the “zone of desired effects,” teacher-student relationships resulted in an effect size of  $d=0.72$ . Remember, any effect size higher than 0.40 is considered to be influential.

Another theory to support teacher-student relationships is the idea of attachment theory, known from the work of John Bowlby. Bowlby’s attachment theory, as cited by

Rimm-Kaufman and Sandilos (2010), “explains how students use their positive relationships with adults to organize their experiences” (“Theoretical perspectives,” para. 2) and that “students with close relationships with their teachers view their teacher as a “secure base” from which to explore the classroom environment” (“Theoretical perspectives,” para. 2). Teacher-student relationships can be linked to psychological support with social development. As stated by Rimm-Kaufman and Sandilos, “Teachers who foster positive relationships with their students create classroom environments more conducive to learning and meet students’ developmental, emotional and academic needs” (“What do good teacher-student relationships look like,” para. 1). It is also reported that “Students who attended math classrooms with higher emotional support reported increased engagement in mathematics learning” (Rimm-Kaufman & Sandilos, 2010, “What do good teacher-student relationships look like,” para. 7).

Additionally, Marzano and Pickering (2011) added that teacher-student relationships are crucial to ensuring students feel good about being in the classroom and that effective teacher-student relationships are the core of a supportive tone in the classroom. It is suggested that powerful teacher-student relationships are molded by behavior and words in contrast to thoughts and feelings. Here, it is not what a teacher thinks or feels about a student, but how the teacher speaks and behaves with the student that encourages positive teacher-student relationships (Marzano & Pickering, 2011). Teachers can shape positive relationships with each student by ensuring fair and equitable treatment of all students, showing interest in and affection for students, and identifying and using positive information about students (Marzano & Pickering, 2011).

To ensure fair and equitable treatment of students, teachers have a legal and

ethical obligation to ensure safety in their classrooms. Teachers can establish expectations for basic safety, curb disruptive or hurtful behavior, and demonstrate respectful interactions (Marzano & Pickering, 2011). To display interest in and affection for students, teachers can demonstrate simple courtesies and use subtle physical contact and gestures. Teachers can greet students at the door, call students by their names, make eye contact, give a high five or thumbs up, wink, nod, or provide physical proximity such as kneeling next to a student. In all cases, it is important for the teacher to use these strategies appropriately and with attention to the student's age, gender, and culture (Marzano & Pickering, 2011). Lastly, to identify and use positive information about students, teachers can communicate information about students to parents, guardians, and fellow teachers. Teachers can make positive phone calls home, seek parent/guardian volunteers, create recognition bulletin boards, display personal photos, or create a scheduled time to share important events or accomplishments (Marzano & Pickering, 2011).

Moreover, it is suggested that most teachers understand automatically that the quality of the relationships they have with students has an impact on student learning (Anderson, 2018). Anderson (2018) reported that through a writing workshop model, which includes conferences, the opportunity to develop relationships with students is presented. It is added that through conferencing, students become known to the teacher and students also learn about the teacher. Getting to know the teacher helps the student be more comfortable and open to learning in conferences (Anderson, 2018). Ultimately, the relationships that grow from conferences are important goals since relationships are central to students' growth as writers.

### ***Guided Math Conferences***

The Guided Math framework consists of seven components: a classroom environment of numeracy, math warm-ups, whole-group instruction, small-group instruction, math workshops, math conferences, and assessment. These components provide teachers with various avenues for identifying and meeting the needs of their students (Sammons, 2014). Sammons (2014) further suggested that even in classrooms where the Guided Math framework is not used, conferring with students provides awareness of students' mathematical thinking and opportunities to provide effective, targeted instruction and constructive feedback.

First, Guided Math conferences provide teachers with a specific structure. Sammons (2014) suggested that math conferences are on average 5 minutes in length and usually center around the current work of the student. Furthermore, Sammons (2014) stated,

With this conversation, the teacher is conducting research to discover both student strengths and needs. The teacher uses this information to provide immediate, specific, feedback and to decide on an appropriate instruction “next step” for the student. Then, within the conference itself, the next step is taught. As such, the major functions of the conference—assessment, feedback, and instruction—are entwined. (p. 19)

This structure was adapted from the writing conference model of Calkins et al. (2005, as cited in Sammons, 2014); however, due to conversation characteristics with Guided Math conferences, Sammons (2014) explained, “The conference is math talk between two mathematicians sharing their knowledge, ideas, and questions. We are able to probe the

thinking of our students to discover the extent of their understanding and to uncover any misconceptions they may have” (p. 62). The Guided Math conference structure follows four specific steps. Table 1 lists each sequential step, along with the role of the teacher, the role of the student, and the lead role during that step.

**Table 1**

*Structure of a Guided Math Conference*

Sequential steps	Teacher role	Student role	Lead role
1: Research student understanding and skill	<ul style="list-style-type: none"> <li>• Observes student work</li> <li>• Listens carefully to student’s description of work</li> <li>• Searches for evidence of strengths and needs</li> <li>• Questions to understand student thinking</li> </ul>	<ul style="list-style-type: none"> <li>• Shows mathematical work</li> <li>• Explains mathematical thinking</li> <li>• Considers and describes possible alternate strategies</li> <li>• Makes mathematical connections</li> <li>• Shares any confusion or questions about the math</li> </ul>	Student
2: Decide what is needed	<ul style="list-style-type: none"> <li>• Decide what the student has done well; compliment</li> <li>• Decide on a teaching point</li> <li>• Decide how to teach teaching point</li> </ul>	<ul style="list-style-type: none"> <li>• Accept and reflect on compliment from teacher</li> <li>• Remain mathematically focused</li> <li>• Prepare to attend to the teaching point</li> </ul>	Teacher
3: Teach to student needs	<ul style="list-style-type: none"> <li>• Teach teaching point</li> <li>• Monitor and assess student understanding of teaching point</li> <li>• Provide scaffolding, if needed, to ensure student proficiency</li> </ul>	<ul style="list-style-type: none"> <li>• Practice what is being taught</li> <li>• Explain the teaching point in own words</li> <li>• Monitor own understanding and share any lack of understanding with teacher</li> </ul>	Shared role
4: Link to the future	<ul style="list-style-type: none"> <li>• Summarize the teaching point</li> <li>• Express an expectation to remember and use in the future to the student</li> </ul>	<ul style="list-style-type: none"> <li>• Share reflection on what was learned</li> </ul>	Shared role

Table 1 illustrates each step of the Guided Math conference structure. Steps



describe how both the teacher and student play a key role in the action of conferencing (Sammons, 2014). Sammons (2014) described, “The individualized nature of the teaching done in this setting allows the instruction to be quite specific to the student needs” (p. 62). Additionally, teachers can determine who to confer with based on classroom observations, listening to student discourse as students work, possible students already in mind, or students who need a challenge; however, it is suggested that teachers confer with all students periodically (Sammons, 2014).

Next, Guided Math conferences offer teachers multiple categories of conferencing that can be used with students throughout the school year. Table 2 displays each conference type that describes and highlights the specific focus (Sammons, 2014). With these categories in mind, teachers can be equipped to place focus on a particular area when deciding to confer with a student.

**Table 2***Types of Guided Math Conferences*

Conference categories	Description	Who is responsible?
Compliment conference	Used to motivate, lift spirits of discouraged learners	Teacher
Comprehension conference	Assessing and extending degree of student comprehension of math concepts	Teacher
Skill conference	Assessing and extending student skills, including both process and computation skills	Teacher
Problem-solving conference	Used to explore problem-solving strategies applied by student and then strengthen their strategy toolbox, if needed	Teacher
Self-assessment and goal-setting conference	Used to review progress toward meeting learning targets and to create learning goals	Teacher and student
Recheck conference	Used to see if students are applying what they learned in previous conference	Teacher

Teachers have the opportunity to truly listen to students' thinking when engaging in one of the possible conference types from Table 2. Sammons (2014) reiterated, "when students—particularly those who struggle—trust us enough to risk sharing their thinking that we can both lead them to see the wonder of mathematics and discover enough about their learning needs to be able to address them" (p. 96).

Another focus of Guided Math conferencing is how to manage conferences. Managing conferences that promote the success of young mathematicians consider (a) scheduling, (b) keeping accurate and timely records, (c) conference note forms, (d) refining conference note-taking skills, and (e) using conference notes to plan instruction

(Sammons, 2014). Sammons (2014) wrote, “The positive effects of the conferences themselves are greatly magnified only when teachers regularly conduct math conferences, maintain an accurate and timely recording system, and then draw upon the data from these conferences to inform their teaching” (p. 163).

## Review of Research

To provide a clear outline for the review of research, Table 3 displays each research study having a core underlying connection to conferencing; however, differences are seen within the content in which the conferencing occurred, as well as with various age groups. Study 1 begins with subject areas of reading and math, and Study 3 leads to other ideas of teacher-student relationships. Table 3 outlines the details of content and age group for each study.

**Table 3**

### *Research Study Descriptions*

Research Study	Content/Subject	Age group
1	Both; reading and math	Elementary
2	Reading and language	Elementary
3	Teacher-student relationships	Preschool to high school
4	Student engagement	Elementary

Table 3 captures a quick snapshot of each research study. Through this quick snapshot, it is indicated that middle grades mathematics has not been widely studied. This can support the significance of my study and the need to address achievement within middle grades mathematics.

### ***Study 1 (Snyder, 2016)***

In a quasi-experimental mixed methods study, two elementary teachers carried out graphing, goal setting, and conferencing with the focus on reading and mathematics

achievement within a private school in South Carolina (Snyder, 2016). Seventy-one weekly individual teacher-student conferences took place over a 9-week intervention time period. To aid the research design, pre and posttests were given for collecting data, while eight weekly interviews with teachers and an end-of-study interview with students and teachers provided qualitative data. The use of testing and benchmark data provided insight on achievement levels for the specific reading accuracy and fluency and math comprehension skills studied. Also, insight was provided from the teachers and students through their ratings on interview forms.

The purpose of this study was to measure the impact of interventions through graphing and goal-setting conferences on reading accuracy, reading fluency, and math comprehension skills (Snyder, 2016). Even though one limitation of this study was the small sample size of only 13 students in third and fourth grades, it was found that “the largest average increase in scores for both grades occurred in math computation” (Snyder, 2016, p. 159). Not only did the quantitative data support an increase in reading fluency and math comprehension, but the qualitative data supported the inclusion of conferencing as an intervention. It is also noted that fourth-grade students showed higher average rates of improvement in both reading fluency and math comprehension compared to the third-grade students. Snyder (2016) stated the difference may be a result of more detailed conferences with the fourth-grade teacher, in which the teacher provided specific teaching points or skill instruction. Through the end-of-study interview with students, it was found that 100% of students wanted to continue meeting with their teachers and setting goals in the future. As Snyder stated, “The potential for the positive impact of continued individualized student-teacher interactions on the improvement academic skills

should be recognized with the conferencing strategy incorporated into classrooms in the interest of increasing instructional effectiveness” (p. 188).

***Study 2 (Sutherland, 2017)***

This study, a quantitative correlation design, looked at the impact of goal setting with conferencing on vocabulary acquisition and areas of reading comprehension (Sutherland, 2017). This study took place within a high-poverty suburban elementary school outside of Chicago, Illinois. Specifically, the study looked at two different subgroups of Hispanics and African Americans in fourth, fifth, and sixth grades. From each grade level, two classes were randomly assigned as a treatment or control group. The study spanned 1 school year, with data being collected and compared after 8 months into the study. It is also important to note that professional development in various areas was provided for teachers of the experimental group, as students within the experimental group participated in weekly goal-setting conferences with their teachers. Dependent variables included vocabulary acquisition, reading comprehension of literary text, and reading comprehension of informational text. The independent variable of the study included the different students participating in the goal-setting conferences. Students were fourth-, fifth-, and sixth-grade students (Sutherland, 2017).

The results of the study found a statistically significant difference in two of the three research questions (Sutherland, 2017). For Quantitative Question 2, an independent *t* test comparing the difference in developmental reading assessment for reading literature growth showed a strong statistical significance in groups at  $p= 0.000$ . For Quantitative Question 3, the independent *t* test comparing the difference in the measure of academic progress for reading information text growth showed a strong statistical significance at

the  $p = 0.01$  level; therefore, the significance is that goal-setting conferences reported a difference between the scores of the experimental group and the control group with reading comprehension of literature and informational text but not with vocabulary acquisition (Quantitative Question 1). Sutherland (2017) further explained that only two of the nine data points yielded statistically significant differences; however, teachers and students both expressed excitement about continuing the conferencing practice after the study. As for further recommendations, Sutherland suggested a narrowing of conference focus, replications in other areas such as writing or math, additional qualitative survey data, or possible administration practices that support the conferencing process.

***Study 3 (Roorda et al., 2011)***

Roorda et al. (2011) studied four analyses of teacher-student relationships. These included positive relationships and engagement, negative relationships and engagement, positive relationships and achievement, and negative relationships and achievement. The meta-analytic approach encompassed 99 studies, a total of 129,423 students, and ranged from preschool to high school-aged students. Roorda et al. introduced and described two theories known as extended attachment and social-motivational approaches and emphasized the importance of student engagement in school within both perspectives. In addition, Roorda et al. presented indications of specific characteristics of students, teachers, and study methods that influence effective teacher-student relationships. As for reported effect sizes, the overall effect sizes for the association between both positive relationships and engagement and negative relationships and engagement were medium to large (between .25 and .40). For associations between both positive relationships and achievement and negative relationships and achievement, Roorda et al. reported small to

medium (.10 to .25); however, effect sizes often differed depending on the methodological characteristics of the primary studies (Roorda et al., 2011).

Furthermore, Roorda et al. (2011) had expected to find stronger associations for negative aspects than for positive aspects of teacher-student relationships but actually found the opposite for secondary schools. Additionally, if analyses were conducted only for primary schools, it is reported that overall associations with engagement were somewhat stronger for negative relationships than for positive relationships (Roorda et al., 2011); however, it was expected that associations with engagement would be stronger than associations with achievement, which proved to be true. Lastly, it was reported that “affective TSRs [teacher-student relationships] remained important, or were even more influential, for older students, even into late adolescence” (Roorda et al., 2011, p. 520) and that teacher-student relationships were more important for students who were academically at risk, specifically those with learning disabilities and students from economically disadvantaged backgrounds.

#### ***Study 4 (Carey et al., 2013)***

In this action research project, three teacher researchers set forth to increase student engagement during independent reading through teacher conferencing, teacher modeling, and student choice (Carey et al., 2013). Due to unexpected circumstances, one of the teacher researchers had to adapt the purpose of the project for middle school science; however, Teacher Researchers A and B collected data from a combined total of 32 fourth graders from one intermediate school located in a northern suburb of Chicago, Illinois. Teacher Researchers A and B utilized a student questionnaire, reading disengagement checklist, parent questionnaire, and teacher questionnaire. Initially, the

student questionnaire showed that 47% of students loved reading independently at school. Also, 78% of students considered themselves good or amazing readers; however, the teacher researchers found that 47% of students chose books by reading the summary on the back of the book, whereas only 3% of students selected books related to their Lexile range. Another aspect to add is that teachers found staring at books and flipping through pages to be the most prevalent off-task and disengaged behavior. Secondly, teachers observed students browsing bookshelves as the next prevalent off-task and disengaged behavior (Carey et al., 2013).

During the third week of the teacher researchers' action plan, teachers began independently reading alongside students for modeling, implemented teacher-student conferences during independent reading time, and implemented a specific strategy with students for selecting books when at the library (Carey et al., 2013). For individual conferencing, teachers utilized a premade conference sheet that contained questions to discuss with students about their reading and reading material. Specifically, teachers included questions to ensure the book was a good fit for students based on the strategy that had been implemented, as well as having students read aloud. Teachers also commented that the discussions provided the opportunity to connect reading strategies that were learned from guided reading groups to their independent reading (Carey et al., 2013).

After 11 weeks of interventions through modeling reading behaviors, individually conferencing with students, and providing student choice in selecting independent reading material, teacher researchers readministered the student questionnaire (Carey et al., 2013). From student responses, data showed an increase from 47% to 59% of students



who loved to read independently at school. Also, an increase from 78% to 97% showed that students believed they were a good or amazing reader. Lastly, of the major behaviors observed from the reading disengagement checklist, all behaviors decreased from the initial observation, except for students going to the restroom.; however, students staring at books and flipping through pages had the largest decrease from 33% to 15%. Overall, the teacher researchers concluded the interventions acted as an integral role in their students' reading engagement. Teacher researchers also noted positive takeaways of improved fluency scores, rich conversations, and dedication to reading experienced from reading conferencing, better understanding students as readers, and students better understanding themselves as readers (Carey et al., 2013).

### **Additional Literature**

As a high school English teacher, Kittle (2013) exclaimed that too many students in high school are not reading. She attributed this idea to students choosing not to read or students having given up trying to read. Kittle found herself faced with students who could barely read, students who were uninterested in reading, students who had never been read to, and those who did not have the “book love” (p. xiii) she had growing up and throughout her life. Kittle found that high school students often lacked engagement when it came to independent reading and that all too often, high school students were not provided a choice of texts or a diverse selection for reading. It seemed as though students were being told to read texts teachers personally enjoyed reading and not what interested the students or were at the students' levels of understanding.

Kittle (2013) defined a system in order to develop necessary skills for readers while building a love of reading and lifelong readers. Through her system, Kittle

incorporated conferencing as a means to monitor her students and their individual reading. Kittle further explained that she has the ability to lead her students through difficult texts; in order to move her students as far as she needs to, she must be able to manage their individual reading lives. Kittle organized her conferences into three different categories: (a) conferences that monitor a reading life, (b) conferences that teach a reading strategy, and (c) conferences that increase complexity and challenge.

Furthermore, Kittle (2013) described conferences as being 3 to 4 minutes long and occurring daily. She further described her record-keeping method as simple as a pad of paper attached to a clipboard that includes a page for each student. This method allows her to cycle through the pages continuously. She continued to describe conference records as allowing her to take notes while listening during the conference and record student absences. Even though her work focused on reading, it can translate to mathematics and is best summarized by a final statement: “Our conference is just a moment in a busy school day, but it feels just right: two people talking about the big ideas in books and how they make us think more deeply about life” (Kittle, 2013, p. 90).

### ***Engagement***

In addition, Marzano and Pickering (2011) offered a model for attention and engagement. At the center of their model, four symbolic questions are presented in order to aid classroom teachers in planning and carrying out instruction that helps foster student engagement. The four questions include

1. How do I feel?
2. Am I interested?
3. Is this important?

#### 4. Can I do this? (p. 19)

Questions 1 and 2 are associated with attention, where Questions 3 and 4 focus on engagement. Marzano and Pickering (2011) defined engagement as positive responses to Question 3 and Question 4, meaning if students have negative responses to the questions, working memory will not maintain the information for long and the brain will likely reject the information. As for attention, Marzano and Pickering defined attention as positive responses to Question 1 and Question 2. However, again, if students have negative responses to the questions, it is likely the information does not make it into working memory and students will have no conscious experience of it. It is also noted that attention applies to a particular event in class, whereas engagement goes beyond a single activity and even beyond a single class period (Marzano & Pickering, 2011).

With an emphasis on Question 3, “Is this important,” if students do not feel classroom activities are important, engagement will be low or possibly nonexistent; however, students feel tasks are important when they relate to the self-system. Also, when classroom activities make connections to the real world, positive responses to Question 3 are produced. To help students positively answer Question 3, teachers can implement the following: (a) connect to students’ lives, (b) connect to students’ life ambitions, and (c) encourage the application of knowledge (Marzano & Pickering, 2011).

In regard to Question 4, “Can I do this,” student responses express their self-efficacy. If the student's response is no and they feel they are unable to complete a task or the task is impossible, the student will not engage fully. It is believed that self-efficacy is the most important factor affecting engagement. Marzano and Pickering (2011) offered the idea that if students answer favorably to Questions 1, 2, and 3 but have a negative

response to Question 4, it is possible that most, if not all, engagement is lost; however, it is suggested that teachers can enhance student self-efficacy by implementing the following strategies: (a) track and study progress, (b) use effective verbal feedback, (c) provide examples of self-efficacy, and (d) teach self-efficacy (Marzano & Pickering, 2011).

Lastly, it should be noted that Marzano and Pickering (2011) communicated that highly engaged classrooms do not happen automatically. Nevertheless, through specific engagement strategies, teachers can create an environment in which students are highly engaged. To reiterate, a daily strategy of building positive teacher-student relationships can be utilized and affect how students respond to Question 1, “How do I feel,” which influences attention and engagement (Marzano & Pickering, 2011).

### ***Language and Literacy Framework for Literature and the Content Areas***

Fountas and Pinnell (2001) provided a three-block framework aimed at achieving literacy within intermediate grades. This flexible framework is comprised of the following components: (a) language/word study, (b) reading workshop, and (c) writing workshop. At the center of their framework, connecting each component is the idea of oral, visual, and technological communication. Here, students have the ability to engage in conversation, presentation, performance/drama, and visual representation all while students explore literature and the content areas (Fountas & Pinnell, 2001). Additionally, this framework expands on the origins of the reading and writing workshop models to include guided reading, literature study, and guided writing. During these workshop blocks, the teacher is delivered the opportunity to confer quietly with individual students (Fountas & Pinnell, 2001).

Writing conferences are suggested to be conversational with the writer and a personal connection between the teacher and student. It is also advised that the teacher sets a goal of teaching the writer, not to fix the current writing piece that is being discussed (Fountas & Pinnell, 2001). Furthermore, it is proposed that conferences (a) help students decide what to write, (b) provide feedback, (c) help writers clarify meaning, (d) teach skills, (e) reinforce writers' strengths, and (f) give writers new ways of thinking. Ultimately, the teacher wants to move the writer forward as a writer during the conference and ensure students have learned something that can be applied to their future writing. This time with students also allows the teacher to gain information for future mini-lessons (Fountas & Pinnell, 2001).

During independent reading of the reading workshop block, teachers are provided occasions to confer with students. Again, a genuine conversation takes place with the reader. Here, the student is treated as a reader, and genuine questions are asked to help the reader and gain valuable information about the reader. It is recommended that the teacher sit next to the reader, which allows the teacher to be at the same height and face to face rather than hovering or leaning over a student; the teacher converse with and listen to the student while conferring; and the conference be balanced with the student talking just as much as the teacher. Also, this opportunity affords the teacher time to make specific teaching points to reinforce the reader's knowledge and provides feedback on the effectiveness of the teacher's instruction. It is important to make notes during this process in order to help guide the next instructional encounter with the student (Fountas & Pinnell, 2001).

Lastly, Fountas and Pinnell (2001) reiterated the need for record keeping. Quick

notes from each conference permit the teacher to reference previous notes to help guide interactions with students, assess the student, and provide instruction. It is recommended that notes be kept in a notebook or on a clipboard and placed within a binder at the end of each week to reflect for evaluation purposes. Another recommendation is to have a place in your classroom where students can sign up to request a conference with the teacher. Even though conferencing often occurs while moving around the room, the teacher could designate a conferring area. This space could contain the student sign-up request and be positioned in the classroom where it will not disturb the conferring process, other students, or the learning environment (Fountas & Pinnell, 2001).

### ***Conferencing Defined***

Munson (2018) indicated, “In all disciplines, conferring is the practice of talking with students as they engage in meaningful work with the purpose of uncovering their thinking and supporting learning in the moment” (p. xix). To continue defining conferences, Munson (2018) explained that a conference is not a setting for students to report on their thinking, but it is a shared opportunity for teachers and students to learn together in the moment.

### ***Components of Conferencing***

The components of conferencing are rather simplistic. Conferencing does not entail expensive resources or require an extended amount of time. Rather, conferencing is “one of the most important moments in teaching—the time when teachers and students talk together and there is an opportunity for students to learn” (Boaler, as cited in Munson, 2018, p. xv). Necessary components of teacher-student conferencing include (a) a teacher, (b) a student or small group of students, and (c) some form of record keeping.

### ***Benefits of Conferencing***

Conferring can present numerous benefits for an array of situations; however, for the purpose of teaching mathematics with student engagement and student achievement, the benefits being presented align solely with mathematics. To provide additional background information, the National Council of Teachers of Mathematics (NCTM) is an organization that began to launch an education standards movement in the 1980s. Today, the organization continues to advocate for mathematics education with publications, research, and standards. First, NCTM defined a set of six guiding principles in their discussion of being fundamental to a high-quality mathematics education. Table 4 outlines the guiding principles for an excellent mathematics program (NCTM, 2014, p. 5).

**Table 4***NCTM Guiding Principles for School Mathematics*

Guiding principle	Description
Teaching and learning	<ul style="list-style-type: none"> <li>• requires effective teaching that engages students in meaningful learning through individual and collaborative experiences</li> <li>• promotes ability to make sense of mathematical ideas</li> <li>• reason mathematically</li> </ul>
Access and equity	<ul style="list-style-type: none"> <li>• requires all students have access to a high-quality mathematics curriculum</li> <li>• effective teaching and learning</li> <li>• high expectations</li> <li>• support and resources needed to maximize learning potential</li> </ul>
Curriculum	<ul style="list-style-type: none"> <li>• develops important mathematics along coherent learning progression</li> <li>• develops connections among areas of mathematical study</li> <li>• develops connections between mathematics and the real world</li> </ul>
Tools and technology	<ul style="list-style-type: none"> <li>• integrates the use of mathematical tools and technology as essential resources to help learn and make sense of mathematical ideas, reason mathematically, and communicate their mathematical thinking</li> </ul>
Assessment	<ul style="list-style-type: none"> <li>• ensures assessment is integral part of instruction</li> <li>• provides evidence of proficiency with math content and practice</li> <li>• includes a variety of strategies and data sources</li> <li>• informs feedback to students, instructional decisions, and program improvement</li> </ul>
Professionalism	<ul style="list-style-type: none"> <li>• educators hold themselves and colleagues accountable for mathematical success of every student</li> <li>• education hold themselves and colleagues accountable for their personal and collective professional growth toward effective teaching and learning of mathematics</li> </ul>

The act of conferencing within a mathematics classroom can serve as evidence for



each principle. Table 4 presents all six principles with accompanying descriptions. Teaching and learning take place during the conferring process through tasks and discourse, all while providing access and equity to each student. Curriculum is being addressed based on the appropriate standards, as well as making connections and attending to skill gaps. As for assessment, conferencing is a means of formatively assessing; the teacher is provided real-time data through meeting and talking with a student. Next, tools and technology can assist the conferencing process by looking at real-world examples, graphs, data, or even making connections while helping students make sense of problems and content. Lastly, conferencing aligns with the principle of professionalism in that teachers are utilizing an instructional method to support student learning and success.

In addition to the guiding principles for school mathematics, NCTM also provides foundational teaching practices. According to NCTM (2014), “Eight Mathematics Teaching Practices provide a framework for strengthening the teaching and learning of mathematics...which represent a core set of high-leverage practices and essential teaching skills necessary to promote deep learning of mathematics” (p. 9). The benefit of conferencing can be seen with the alignment to each of the eight mathematics teaching practices (Appendix D). Mathematical skills and a deep understanding are developed, not only for the class as a whole but on an individual level, too.

As stated by NCTM (2014), “Most important, creating effective classrooms and learning environments for all students in every school and district will take *teachers* who plan and implement effective instruction as described by the Mathematics Teaching Principles” (p. 114). Teachers are able to pose purposeful questions, facilitate meaningful

discourse, build fluency through conceptual understanding, as well as support productive struggle, and maintain learning goals. Conferencing is also a time when teachers can select certain tasks that require students to reason and share problem-solving strategies in order to arrive at a solution. This individual time with students can also access student connections with mathematical representations and student explanations that support student learning. All eight practices support effective teaching and an effective mathematics classroom. It is stated by NCTM that its work is simply words and will remain only words on paper unless action is taken. Furthermore, NCTM acknowledged,

All of us who are stakeholders have a role to play and important actions to take if we are finally to recognize our critical need for a world where the mathematics education of our students draws from research, is informed by common sense and good judgement, and is driven by a nonnegotiable belief that we must develop mathematical understanding and self-confidence in *all* students. (p. 109)

Additional benefits of conferencing are presented through Sammons's (2014) Guided Math conferences. Sammons (2014) summarized Guided Math conferences best by describing the following:

Guided Math conferences are an effective instructional vehicle for teachers to apply many of the practices that research shows are instrumental in promoting learning success. Studies highlight the positive impact of formative assessment by teachers and students, timely descriptive feedback, and goal setting—all of which are integral ingredients of math conferences. (p. 58)

Sammons's (2014) work simplified seven values of conferencing into everyday teaching methodologies. The values include

1. Knowing What Matters: Learning Through the Eyes of Young Mathematicians
2. Empowering Young Mathematicians With Effective Feedback
3. Establishing Student Learning Goals
4. Promoting Accountability
5. Teaching and Learning
6. Encouraging Mathematical Communication
7. Building Relationships (Sammons, 2014).

When thinking about the first stated value, Sammons (2014) explained the importance of utilizing conferences for formative assessments, as well as for student self-assessments. Sammons (2014) wrote that Guided Math conferences provide teachers with the right information needed to decide how to proceed with instruction, along with opportunities to target students' immediate learning needs with combining assessment and instruction. This idea relates back to the notion of assessment *for* learning as previously discussed. "With one-on-one conversations, assessment and instruction can be one and the same. The assessment experience itself can be a powerful instructional tool for teachers and students" (Sammons, 2014, p. 38).

As for the second and third values listed, Sammons (2014) declared, "At its best, feedback motivates students to manage their progress toward clearly articulated learning goals and places the emphasis on learning rather than on simply attaining a good grade" (p. 46). In mathematics, students are most accustomed to receiving feedback through grades that consist of which problems were correct or incorrect, a grade from a worksheet or test. Often, students do not receive the feedback needed on how to improve and see

their grades as a measure of their success (Sammons, 2014). Sammons (2014) emphasized that feedback is most effective *during* the learning cycle, not *after* it, and that teachers who confer regularly with students are more likely to catch the mathematical errors of young mathematicians before they become habitual. Sammons (2014) further characterized what is considered effective feedback. The details of effective feedback are presented in Table 5.

**Table 5**

*Characteristics of Effective Feedback*

Characteristics	Effective feedback
1	Is clear and specific, focusing on things that are within the learners' control
2	Is user-friendly, understandable to students
3	Is honest and respectful
4	Is delivered in a timely manner, but may not always be immediate
5	Prompts student thinking rather than doing it for them
6	Is differentiated in response to student learning needs
7	Addresses partial understanding by students
8	Directly references and aligns with the intended learning target by describing student work or thought processes in relationship to those learning goals
9	Addresses quality of the performance, the work product, or conceptual understanding rather than the student themselves
10	Is actionable and focused on one or at most two things a student can use immediately to improve their performance or understanding

Table 5 highlights 10 different characteristics of effective feedback. These characteristics can provide educators a starting point or reference for delivering their

students the most powerful feedback. While Sammons (2014) acknowledged there is no simple prescription for offering effective feedback to all students, Sammons (2014) did distinguish that the personal nature of Guided Math conferences is a valuable setting for feedback. In this setting, students are sharing their mathematical thinking with their teachers.

When considering Value 6, mathematical communication gives students the opportunities to explain their thinking processes and use of strategies. It also provides teachers an opportunity to probe, as well as model math-specific vocabulary during dialogue, and provides students the expectations of communicating through “math talk” (Sammons, 2014, p. 55). This value supports the idea of self-assessment, which was described previously. With strong communication skills and the ability to use content vocabulary correctly and appropriately, students are better equipped to self-assess effectively. Also, when referring to NCTM’s Mathematics Teaching Practices (Appendix D), the practice of facilitating meaningful mathematical discourse closely relates to Sammons’s (2014) value of encouraging mathematical communication. It is important to have students talking about mathematics: clarifying, explaining, reasoning, describing, and even comparing ideas.

Lastly, Sammons’s (2014) value of building relationships provides an aspect of education for which all teachers strive. The value of building strong relationships is supported by Hattie’s (2009) work, Bowlby’s (1969, as cited by Rimm-Kaufman & Sandilos, 2010) attachment theory, and Marzano and Pickering’s (2011) work previously presented and discussed in the literature review. It is best summarized when Sammons (2014) explained that when teachers choose to take time to confer with students about

their mathematical work and understanding, it sends a clear message that teachers care. She continued by illuminating that when teachers truly listen and share their thinking with students as one mathematician to another, respect and concern for student success are displayed.

### **Summary**

Theorists and theories were presented, and the literature cites social constructivism, feedback, assessment, relationships, and Guided Math conferences as a focus, supporting the improvement of engagement and achievement. In addition, multiple studies have been summarized that highlight various situations of conferencing within different content areas and grade levels. These studies also support the improvement of engagement and achievement. Sammons (2010) expressed that conferring “is the heart and soul of teaching. As we confer with students, we sit alongside them at their levels and listen intently to their words, trying to follow their reasoning and probing to determine the extent of their understanding” (p. 207).

## **Chapter 3: Methodology**

### **Introduction to Methodology**

Chapter 3 describes the methodology that was executed for this study. This chapter emphasizes the research design, participants, instrumentation, data collection, data analysis, and present reliability and validity of the study. The methodology presented was designed for face-to-face instruction; however, due to COVID-19 and state mandates, instruction beginning in the fall of 2020 presented distance learning scenarios. All processes and ideas were easily adjustable, if needed, due to technology capabilities and communication access.

### ***Purpose***

The purpose of this section is to outline how the research occurred, as well as who was responsible for certain aspects and why this format was determined. In addition to the research design, participants, instrumentation, data collection, and data analysis are all outlined.

### ***Research Questions***

Through the outlined methodology, the following research questions are addressed.

1. What is the impact (as perceived by the teacher) of teacher-student conferencing on student engagement?
2. What is the impact (as perceived by the teacher) of teacher-student conferencing with student achievement?

## **Research Design**

### ***Qualitative Method***

The research design for this study followed a qualitative method design approach. In addition, qualitative methods depend on text, image data, unique steps in data analysis, and turn to diverse designs (Creswell, 2018). All data collection was in the form of qualitative data. Qualitative data included (a) teacher journaling, (b) observation data, and (c) teacher-student conference logs.

### ***Case Study***

A case study was selected due to the exploration of a specific activity, teacher-student conferencing. Creswell (2018) described, “Case studies are a design of inquiry found in many fields, especially evaluation, in which the researcher develops an in-depth analysis of a case, often a program, event, activity, process, or one or more individuals” (p.14). This research occurred for a set amount of time and focused on key details of the process.

### ***Justification of Design***

A case study was selected in order to explore and compare in-depth teacher perceptions of student engagement and student achievement with similar groups of students. A qualitative design is justified due to certain characteristics such as the natural setting of the study, multiple sources of data, and the idea of education falling within the social sciences (Creswell, 2018). Through the examination of the relationship established between the teacher and student during conferencing, by reading the teacher’s words and observing teacher behaviors, I hoped to better understand the connection between teacher/student relationships and student engagement and achievement in math.



## Participants

### *Setting*

This study was conducted in one middle school within a district located in North Carolina. As for the educational setting, middle grades were selected. These grades include sixth grade, seventh grade, and eighth grade. Students in middle grades typically range between 11 years of age and 14 years of age. General education classroom settings were selected too. The rationale for not including Exceptional Children (EC) is that EC settings incorporate service times, Individual Education Plans, and the high probability of an EC teacher being present in the inclusion classroom. These are reasons for excluding EC settings, due to this population receiving additional services compared to the general education population. As for not including Academically or Intellectually Gifted (AIG) settings, the rationale is that AIG students often receive increased rigorous instruction and often meet with AIG specialists for enrichment opportunities. Again, this population of students often receives additional services compared to the general education population. Table 6 provides broad descriptions of the classroom settings in which teacher-student conferencing was implemented for research. There are no specific data pertaining to students because of teachers being research participants, not students.

**Table 6**

### *Setting Descriptions*

Classroom	Grade	Setting: General, EC, AIG	Title I status
A	6	General	Yes
B	8	General	Yes

Table 6 indicates the grade level, classroom setting, and Title I status of each classroom. These details help provide a general image of students engaging in teacher-

student conferencing. It is important to indicate that each classroom is labeled according to the corresponding teacher participant described below. The teacher participant conducted teacher-student conferencing with two different grade levels and a total of four different classes.

### ***Sample Population and Size***

Research participants were teachers who volunteered from one district in the state. In order to obtain participants, I had to personally email mathematics teachers, as well as seek participants through social media. The teacher participant was a mathematics teacher in a public, middle school setting. For this case study, one teacher volunteered. Over 50 teachers were initially emailed (Appendix E); however, teachers had to be emailed in smaller groups for a second attempt. From this approach, three teachers responded directly to the inquiry, and I was able to recruit an additional teacher via social media; however, due to the response to the COVID-19 pandemic and district changes regarding daily schedules, the creation of cohorts and establishing a virtual school, only one teacher was able to carry out participation. Teacher participant details are outlined in Table 7.

**Table 7**

#### ***Research Participants***

Participant	Grade level	Region	Years of experience
Teacher participant	6 & 8	Southeastern NC	12

Table 7 presents the research participant and general information to build a background for the sample population. The teacher participant currently taught sixth- and eighth-grade mathematics but also had 12 years of teaching experience with EC 6-8 reading and math, Math I, and AIG math. The teacher participant implemented teacher-

student conferencing in their classroom beginning in February 2021. The teacher participant reported having previous experience with conferencing during the class time setting in which diagnostic data, growth, EVAAS scores, and projected EOG scores were discussed. This allowed the teacher participant to discuss individual math data reports with students through specific online programs, as well as state-projected data.

### ***Participant Process***

Before the teacher participant began to implement teacher-student conferencing, a training session was held with the participant individually. This occurred virtually and was necessary to explain and distribute research protocols, instrumentation, and expectations. Due to COVID-19 and state mandates, electronic communication was heavily utilized. COVID-19 mandates included a limited number of people within a room or building; a social distancing protocol of 6 feet; and face coverings being required at many locations, including schools. Many school districts within North Carolina did not allow students or teachers to return to school buildings for fall 2020 instruction to ensure social distancing and to help limit virus exposure. Meetings were often carried out virtually to follow the prescribed mandates.

First, I provided the teacher participant with a journal and a digital copy of the conference log template. The teacher journal was tangible and hardbound, with the option of having conference logs printed or digital copies. I explained to the teacher participant that these two tools were their primary source of reflection, where teachers would write thoughts about their class, compare ideas, and focus attention with regard to student engagement and achievement from the result of teacher-student conferencing. The teacher participant was free to write and include information they felt was most

important. Also, the teacher participant had the choice to reflect daily or weekly in order to fit their personal reflection process needs and time management. I suggested to the teacher participant that conference logs be kept in a folder, a three-ring binder, or even on a clipboard, but be placed somewhere visible and easily accessible. Again, this would be a personal choice of the teacher participant and what works best within their classroom and with the routine of conferencing. Also, I informed the teacher participant that these two tools would be collected by me at the end of the research timeline. Once these tools were collected, they were secured in a locked safe at my residence. Upon completion of the research, all data were destroyed for confidentiality purposes by June 2022.

Second, I reviewed the observation protocol (Appendix F) with the teacher participant to keep all communication open and uphold trust. I wanted the teacher participant to feel informed of my actions while in their classroom, as well as be aware of the actions I would be observing during the conferencing process. Next, I provided the teacher participant with a digital copy of the different types of conferences from Table 2. This handout (Appendix G) allowed me to communicate and discuss with the teacher participant the different types of conferences they had the ability to utilize, as well as to provide the teacher participant with a quick go-to reference. Through my suggestion, the teacher participant could place the handout, which is like a bookmark, in their journal or with their conference logs.

Finally, I reviewed the characteristics of effective feedback from Table 4 with the teacher participant. During the review, I also provided the teacher participant with examples of effective feedback, so the teacher participant was able to see what it looked like. Teachers are often familiar with providing feedback to students; however, it was

important to clarify and answer any questions about effective feedback. This entire review process of the expectations and instrumentation provided valuable dialogue and collegial inquiry (Drago-Severson, 2009) between me and the teacher participant. Expectations were taught by virtually meeting with the teacher participant and verbally explaining and showing each part. The teacher participant was taught conferencing expectations, grounding the research in Sammons's (2014) model of conferencing and enhancing the reliability of outcomes.

### **Distance Learning**

To fit the demands of a new look for public education in the state of North Carolina, as well as to abide by state health mandates, teachers could continue to carry out distance learning with teacher-student conferencing during the spring 2021 semester. Distance learning looked different for all stakeholders. No two classrooms looked the same, nor were teaching styles identical. In relation to this study, the teacher participant could still apply teacher-student conferencing through means of distance learning. Face-to-face conferencing was ideal and desired; however, virtual conferences are promising and could still produce qualitative data needed for this study.

The teacher participant could choose to implement virtual conferencing, if needed, for scheduling purposes or district requirements. Through technology and various online platforms of Microsoft Teams, Google Meet, and Zoom, the teacher participant was equipped to carry out virtual conferencing. Even though distance learning does not take place in a traditional school year or classroom, teachers would still be able to meet with students individually and assess student learning. Through additional online platforms such as Flipgrid, Pear Deck, Whiteboard.fi, Padlet, or Google Jamboard, the

teacher participant had the capability to observe student work samples, listen to student explanations, question students, and look for future teaching points. Another benefit of virtual conferencing is that many of the online platforms mentioned above provide the option to record live sessions. This could present additional benefits when looking for common errors or misunderstandings with student learning.

The structure of a virtual conference would be no different than a face-to-face conference. The teacher would meet with a student individually for 3 to 5 minutes using an electronic device and online platform while recording notes on the designated instrumentation. Teachers can still provide students with timely feedback, as well as build relationships and apply social connections through intentional discourse and online communication. Even though the teacher and student would be separated by screens, the use of online praise stickers, emojis, video responses, and filters can add to the relational capacity of virtual conferencing.

All research instrumentation still applied to distance learning. I provided the teacher participant with a hard-bound journal and shared a digital copy of the conference log. If virtual conferencing occurred, I was still able to collect journals and conference logs from the teacher participant. The teacher participant was informed of this information and options during the teacher participant training that I provided before the teacher participant implemented teacher-student conferencing.

## **Instrumentation**

### ***Teacher Journaling***

Journaling was a means of collecting qualitative data for this study. The teacher participant wrote in a journal and made recordings based on specific criteria of the research questions. The teacher participant was asked to follow a journaling protocol of recording perceptions associated with teacher-student conferencing with student engagement and student achievement within their classroom. The teacher participant selected two sixth-grade math classes and two eighth-grade math classes as the focus. These four chosen classes are where teacher-conferencing was implemented. The teacher participant had the opportunity to write and reflect as often as needed, but this process was not prompted by me. This was a choice of the teacher due to personal reflection needs and time management; however, since Sammons (2014) suggested meeting with all students periodically, it was encouraged that the teacher participant write weekly. The journaling process was estimated to cover a semester of time from roughly January 2021 through May 2021. Through the journaling process, the teacher participant would be able to organize thoughts in a systematic approach to provide data to me.

### ***Observations***

Periodically, observations occurred in the teacher participant's classes to observe the conferencing process. The goal was to observe the teacher participant's classroom twice a month on different days of the week. This goal would allow for increased fieldwork and reliable data. It would also provide the opportunity to see the teacher participant working with different students. Creswell (2018) expressed that qualitative observations take place at the research site and involve the researcher taking field notes

on the behavior or activities in an unstructured or semi-structured way. During observations, I recorded anecdotal notes on the observation template, providing qualitative data for the study. This template, or protocol, helped structure the notes and outline the approach to data recording for a qualitative study (Creswell, 2018). The observation protocol followed a two-column notes format (Appendix D). I looked for the following teacher-driven behaviors during an observation: structure of the conference, use of conference logs, and oral feedback. Prior to conference implementation, the observation tool was shared with the teacher participant.

### ***Conference Logs***

Through conference logs, the teacher participant had a systematic way of tracking and recording conference notes with individual students. The teacher participant utilized the provided conference log template (Appendix H). This instrumentation is based on the Guided Math Conference Notes template from the Guided Math (Sammons, 2010) framework. Sammons (2014) noted that the form allows the teacher to record the student's name, date of the conference, what was learned during the research phase of the conference, the compliment given for an observed strength, and the teaching point. This instrumentation provided perceptual data from the teacher participant about specific students at specific points in time. Conference logs were analyzed by reading and rereading to help uncover observable patterns and themes.



## Data Collection

As the researcher, I used teacher journaling, observations, and conference logs to collect data. Once the research was complete, I was able to collect journals and logs from the teacher participant. Observation notes were already in my possession; I was able to electronically save notes at the end of each observation session. Table 8 indicates the process and timeline for research and data collection.

**Table 8**  
*Process Timeline*

What	Who	When	How
Teacher participant training	Researcher and Teacher participant	March 2021	Face-to-face or virtually
Execute conferencing	Teacher participant	March-May 2021	Within their classrooms with different classes, virtually, if needed
Observe conferencing	Researcher	Scheduled date	Visit classroom of teacher participant; utilized Appendix D
Collect journals	Researcher	June 2021	Mail courier
Collect conference logs	Researcher	June 2021	Mail courier
Collect observation notes	Researcher	Monthly	Will already be in researcher's possession, within a folder
Interview	Researcher and Teacher participant	June 2021	Virtually

Table 8 outlines various components of the research process, as well as who was responsible for each action and how each component was completed. As a final step, I held an interview focus session with the teacher participant at the conclusion of all

conferencing and observations. Danielson (2006) clarified that a focus group allows for structure and in-depth exploration of an issue. This interview session was held virtually to meet scheduling agreements. After data collection and analysis were finished, I shared the results with the teacher participant to further probe their insight and meaning.

Thoughts from the teacher participant allowed open-ended conversations, leading to additional data points and possible conclusions for replicated research. In addition, qualitative interviews allow the researcher an opportunity to hold face-to-face interviews, telephone interviews, or focus group interviews with the participants of the study. These interviews usually include participants and provoke views and opinions (Creswell, 2018). Through teacher leadership skills of collaboration, facilitation, and planning (Danielson, 2006), I led the interview focus session to gain additional perceptual information.

### **Data Analysis**

Specific procedures were utilized to analyze data gathered from each instrumentation. The use of a combination coding method and a second reader was applied. Through emerging codes and predetermined codes (Creswell, 2018), specific words were preselected that could potentially appear within the data. Also, these codes can be referred to as emic and etic codes. This predetermined list (Appendix I) allowed a second reader and me a baseline of common ideas that relate to the research.

Predetermined codes for achievement were discussed and developed based on NCDPI achievement level ranges and descriptors for mathematics EOGs (NCDPI, 2022b), in addition to the reinforcing effort and providing recognition strategy (Marzano et al., 2001). Predetermined engagement codes were selected based on the work of Skinner et al. (2009), as suggested by Marzano and Pickering (2011). The rationale for utilizing

NCDPI achievement level descriptors is that teacher participants are familiar with the North Carolina EOG achievement levels for mathematics, and it supports a common language throughout the research. As for the rationale for the predetermined engagement codes, the work of Skinner et al. supported the attention and engagement model (Marzano & Pickering, 2011) previously presented. These codes helped identify themes that described teacher perceptions of engagement and achievement. Emerging codes presented information from the teacher participant that was not predetermined beforehand but occurred naturally through the process.

A second reader was utilized to aid and clarify findings that were unbiased. The purpose of a second reader was to enhance the findings. The second reader is National Board certified, a previous North Carolina classroom teacher, a current social studies teacher for a district in Delaware, and a doctoral candidate familiar with processes and expectations of research.

### **Validity and Reliability**

As part of the analysis process and verification, I used multiple validity procedures to ensure the accuracy of the findings (Creswell, 2018). It is recommended that researchers use multiple validity procedures to improve the researcher's ability to evaluate the accuracy of findings and assure the readers of the accuracy (Creswell, 2018); therefore, data were triangulated through the analysis of teacher journals, observations, and conference logs. Rich descriptions were utilized between the second reader and me when discussing codes, patterns, or themes during the analysis of journals and conference logs. Also, member checking was seen after the interview process. Data were coded, and themes emerged from the codes. I communicated the findings to the teacher participant to

ask the teacher participant to confirm or refute the findings. Creswell (2018) added that member checking supports the accuracy of your findings by providing final reports to the participants and having them comment on the findings to conclude the accuracy (Creswell, 2018). Another approach to accuracy is the fact that I was able to spend prolonged time in the field observing the teacher participant in action while carrying out qualitative research. Lastly, peer debriefing was utilized to further validate the findings. As stated by Creswell (2018), “This process involves locating a person (a peer debriefer) who reviews and asks questions about the qualitative study so that the account will resonate with people other than the researcher” (p. 201). The peer debriefer is a previous North Carolina classroom teacher and current digital learning teaching facilitator in a district in southeastern North Carolina who holds a Master of Education in Instructional Systems Technology and is a Microsoft Innovative Educator expert and a Microsoft master trainer.

As for reliability, the use of cross-checking and intercoder agreements was employed to ensure consistency of coding with teacher journals and conference logs. It is suggested that single researchers find another person to cross-check their codes, which is considered an intercoder agreement (Creswell, 2018). Creswell (2018) explained, “Such an agreement might be based on whether two or more coders agree on codes used for the same passages in the text” (p. 202). Communication with the second coder was documented through meetings and sharing of analyses (Creswell, 2018).

**Summary**

This chapter highlighted the research design of the study. For this research, a qualitative methods case study was conducted. To understand and determine the impact of teacher-student conferencing on student engagement and with student achievement, specific instrumentation was developed by me and utilized by the teacher participant. These specific tools included teacher journaling, observations, and conference logs. In addition, at the conclusion of conferencing and observations, a focused interview was held. An open-ended conversation with the teacher participant enhanced data and pointed toward conclusions. Data were collected and analyzed to support the outcome of the study. The results of the study may be presented to district stakeholders and administrators or even guide future professional development for mathematics teachers.

## **Chapter 4: Results**

### **Introduction**

The focus of the research study was to determine the impact of teacher-student conferencing in middle grades mathematics classrooms on student engagement and with student achievement. A description of the research sample and setting is provided to describe the participant in the study. Also highlighted in this chapter is a detailed summary of qualitative data findings. Results are presented in two main categories reflecting the research questions of student engagement and student achievement. Results are then further presented based on research instrumentation and grade level.

The research followed a qualitative design, and a single case study was purposely chosen to investigate teacher-student conferencing. These ideas were selected because of the teacher providing perceptual data concerning the effects of teacher-student conferencing and because conferencing is a specific, observable, action. The conferring process was implemented by one teacher participant, which transpired on a volunteer basis. As the researcher, I was able to spend time in the field, observe the teacher participant and classes, and collect anecdotal notes concerning this study. Before research began, I virtually met with the teacher participant to explain and distribute research protocols, instrumentation, and expectations. This meeting occurred to ensure the teacher participant understood the process and had the opportunity to ask questions before starting.

As for instrumentation, three main tools were applied for the research methodology. Teacher journal entries, conference logs, and observations all provided qualitative data. The teacher participant carried out a journaling process throughout the

study to record personal thoughts regarding conferencing with students during math class. In addition, the teacher participant recorded notes on conference logs while conferring with a student or shortly after the conference. Also, I conducted observations of the teacher participant executing teacher-student conferences with sixth- and eighth-grade students.

### **Description of Sample**

One teacher participated in this case study. The teacher participant was a middle school mathematics teacher in southeastern North Carolina. With over 12 years of teaching experience, the teacher participant taught mathematics and reading across multiple grades in the middle school setting. It was also indicated that the teacher participant had previous experience with conferring with students about diagnostic results, growth, and EOG predictions based on EVASS data. The teacher participant did volunteer to participate in the study.

The teacher participant implemented teacher-student conferencing for 9 weeks in the second semester of the 2020-2021 school year. The research was carried out from March 2021 through the end of May 2021. This study was conducted with two sixth-grade mathematics classes and two eighth-grade mathematics classes. Teacher-student conferencing was practiced in a total of four different classes with over 100 students.

### **COVID-19**

The following data are a result of the teacher participant conducting face-to-face teacher-student conferences. When research first began, the district set out to provide instruction in a cohort design to address state COVID-19 mandates and restrictions. Students were divided into two cohorts, Cohort A and Cohort B. Cohort A would attend

school in person on Monday and Tuesday, while Cohort B would attend virtually through an online platform. On Wednesdays, teachers had the opportunity to provide office hours to virtually meet with students to answer questions, discuss assignments, or just check in with students. On Thursday and Friday, the cohort model would flip, and Cohort B would attend school in person, while Cohort A would be at home attending virtually.

This information is provided to describe the weekly outline of the teacher participant while research occurred. Even though the teacher participant had the available resources and opportunities to hold virtual conferences on Wednesdays, all teacher-student conferences occurred in person, face-to-face with sixth- and eighth-grade students from March 2021 through May 2021. Once the cohort model was lifted by the district and students were able to attend in person all 5 days, the teacher participant continued to carry out conferencing face-to-face with all students. The following qualitative findings are a result of face-to-face teacher-student conferences.

### **Summary of the Qualitative Findings**

Over the course of 9 weeks, the teacher participant conducted a total of 78 weekly teacher-student conferences. The teacher also completed 16 journal entries and 22 pages of conference logs. As the researcher, I completed five observations in the teacher participant's classroom and held a focused interview with the teacher participant at the culmination of the research.

Teacher journal entries, conference logs, and observations all provided these findings after data collection. The interview also provided perceptual data, which came from seven interview questions (Appendix J). The data collection process involved the teacher participant sending the tangible journal and conference logs through a courier



service directly to me. The courier service helped with convenience and scheduling conflicts, especially since it was near the end of the school year. Observation notes were already in my possession and did not need further collecting, along with the interview responses since the interview occurred virtually and was recorded with the participant's permission. I coded data using predetermined codes, all developed prior to the research process. Table 9 presents the predetermined codes (Appendix I) used for the qualitative case study.

**Table 9**

*Predetermined Code List*

Engagement	Achievement
Engagement:	Proficient/not proficient
• On task	Comprehensive understanding
• Behaviors: attention, focus, involvement, attempts, effort, exertion, action initiation	Thorough understanding
• Emotions: Enthusiasm, interest, enjoyment, satisfaction, pride, vitality, zest	Sufficient understanding
	Inconsistent understanding
	Above/below
	On grade level
	Not on grade level
	Goals
	Objectives/learning targets
Lack of engagement:	Growth
• Off task	Accomplished
• Behaviors: passivity, giving up, withdrawal, unfocused, inattentive, distracted, unprepared, absent, half-hearted	Met/not met
• Emotions: boredom, disinterest, frustration, anger, sadness, worry/anxiety, shame, self-blame	

## **Detailed Analysis of Qualitative Findings**

The following data present qualitative findings based on the research questions. First, student engagement findings are presented and organized by research instrumentation. Within each instrumentation section, overall engagement is addressed, as well as behaviors and emotions associated with engagement or lack of engagement. Next, student achievement data are presented and organized by research instrumentation as well. The research questions that guided this study were

1. What is the impact (as perceived by the teacher) of teacher-student conferencing on student engagement?
2. What is the impact (as perceived by the teacher) of teacher-student conferencing with student achievement?

## **Student Engagement**

### ***Teacher Journaling***

During the teacher-student conferencing practice, the teacher participant was asked to journal perceptions of the conferencing process, particularly with information regarding student engagement. The teacher participant wrote weekly in most cases and each week had at least two entries. The teacher handwrote journal entries and included specific dates and grade-level details. This added information allowed the data to be coded and categorized by grade level in several instances. Using predetermined codes (Appendix I) and Dedoose, an analysis software, the process of coding and categorizing occurred. From the 16 total journal entries, Table 10 provides samples of descriptive teacher quotes reflecting student engagement.

**Table 10***Engagement Teacher Quotes*

Sixth-Grade entries	Eighth-Grade entries	Both grades
“Colored the base of the shape-- talked about it stacking on top (height), used manipulatives.”	“Met before we started, that way they could participate more”  “This conferencing helped because I felt like it let them ask more questions that they normally wouldn't ask.”  “I then had them conference with each other and that allowed more students to catch on.”	“Students were starting to ask themselves the guiding questions to help answer their own questions.”

Table 10 represents certain journal entries that matched engagement. As seen, the teacher provided samples for sixth grade and eighth grade. The teacher participant's final journal entry did not specify a particular grade level; therefore, it represented both grades.

As for student behaviors associated with engagement, teacher journaling resulted in several entries that matched various predetermined codes. These were behaviors that students exhibited while conferencing was taking place or because of conferencing. In the teacher participant's journal writings, there were no journal entries that matched predetermined codes for behaviors associated with lack of engagement; hence, Table 11 only presents action verbs pulled from behavior quotes within the teacher participant's entries that were associated with engagement.

**Table 11***Action Verbs Related to Engaged Behavior From Teacher Quotes*

Sixth-Grade entries	Eighth-Grade entries	Both grades
Colored	Participate	Ask/asking
Talked	Ask/asked/asking	Answering
Used	Work backwards	
Doing	Stretch	
	Talk	
	Working	
	Whipping through (the work)	
	Describe	

Table 11 shows action verbs used within the teacher participant's journal entries that connect to engaged student behaviors. These behaviors occurred during the teacher-student conferences or because of conferencing.

As for emotions associated with engagement and lack of engagement, there were no data within the teacher participant's journal entries that matched any of the predetermined codes. Additionally, there were not enough similar-themed entries to generate a new code; therefore, there are no teacher quotes to present. This was true for both grades, too.

### ***Observations***

During the research phase, the teacher participant was observed five times over 9 weeks. This includes five different sessions and numerous hours in the field.

Observations often occurred back-to-back because of the teacher participant's schedule. Eighth-grade classes occurred in the morning and sixth-grade classes followed later in the day. It can be mentioned that Observation 1 did not generate data related to the research; thus, observation notes were removed from the data set and never coded. Of the four applicable observations, Table 12 reveals grade-level ratios that represent overall

engagement or lack of engagement compared to the total observations.

**Table 12**

*Researcher Notes*

Grade level	Engagement	Lack of engagement
Sixth grade	2:2	1:2
Eighth grade	2:2	1:2

Table 12 shows the total number of times each grade level was observed, as well as corresponding matches for engagement and lack of engagement codes. Sixth-grade classes were observed twice, and eighth-grade classes were observed twice. For both grades, engaged students were observed during both observations, while unengaged students were observed during one of the two observations.

As for behaviors associated with engagement, it was observed that students were engaged during the conferencing process. When called to confer with the teacher, students would walk to the teacher table, which was positioned at the front of the classroom. The teacher had the conference logs, student work, and the teacher laptop present during each conference. Students were comfortable standing next to the teacher and exhibited behaviors of eye contact, head nodding, giggling, smiling, hand motions when explaining, and closing eyes when thinking. Even though these behaviors did not match predetermined codes (Appendix I) for engaged behavior, it was obvious students were engaged during the conference.

When students were not conferring with the teacher, students were often working independently or with a table partner. While students were completing their independent work, the teacher had the capability of addressing any off-task behaviors. The classroom setup and structure of the conferences allowed for the natural flow of conversation and

interaction between the teacher and students. Table 13 presents specific predetermined codes that matched engaged behaviors or lack of engaged behaviors during the observations I conducted.

**Table 13**

*Researcher Engaged Behavior Notes*

Engagement: behavior codes	Researcher notes	Lack of engagement: behavior codes	Researcher notes
On task	<p>“Boy- student reads question in head; teacher, “Not using a math term, what is she doing?” “Show me”; student models operation/computation on whiteboard but struggles to explain reasoning when teacher prompts for an estimation; teacher then prompts student to list multiples of a number in order to nudge student along.”</p> <p>“Teacher moves from student to student to answer their questions; teacher monitors student work by walking around classroom between conferences.”</p>	Off task	<p>“Some off task behavior; pulling ice out of a water bottle; tapping pencils”</p> <p>“Very little off task behavior; one student fiddling with a key chain”</p> <p>“Little off-task behavior with off-task conversations”</p>
Involvement	<p>“Girl- Student reads question aloud to teacher...“what operation?” Student models thinking on whiteboard; teacher teaches to student need; “Good job.”</p> <p>“Boy- teacher prompts student to graph coordinates, teacher watches (research/decide), then teaches to need. Student also asks if the problems they reviewed were the only two questions he got wrong.”</p>	Withdrawal	<p>“One student asleep by end of class 2:55”</p> <p>“2 students with their heads down during Do Now”</p>
Focus	<p>“Students have eye contact with teacher when conferencing. Students stand beside teacher.”</p> <p>“Boy, navy t-shirt- Student explains their reasoning and uses hand motions to help with explanation”</p>	<p>Unfocused</p> <p>Distracted</p>	<p>“Students are redirected by teacher to ‘Focus’ to whole class”</p> <p>“Off task conversations with table partners”</p> <p>“One student flipping water bottle; table partner”</p>

If students demonstrated a lack of engaged behavior, it was during independent work time, not during a conference, which is indicated in Table 13. Withdrawn behaviors occurred only if a student was not participating in a conference, which was exhibited by student(s) sleeping or with their head(s) down. Engaged behaviors hugely outshined lack of engaged behaviors.

As for emotions associated with engagement, only positive reactions were observed from the students while one-on-one conferences were taking place. As the teacher followed the same structure for each conference and students would stand next to the teacher, students listened carefully and reacted to the teacher's questions or feedback. Emotion notes were captured using the observation tool, read, reread, coded using the predetermined codes, and revisited for analysis. Two of the seven predetermined codes matched my observation notes and are highlighted in Table 14.

**Table 14**

*Researcher Engaged Emotion Notes*

Engagement: Emotion codes	Quotes
Interest	<p>"Student asks if they are going to go over more (problems)"</p> <p>"Girl- navy hoodie- shakes head yes"</p>
Enjoyment	<p>"Girl- head nodding and eye contact with teacher; teacher "Now we talked about..."; teacher and student giggle; read next question and discuss"</p> <p>"Girl- smiling and little laughs occur"</p>

Table 14 shows two specific matches between my anecdotal notes from the observations and the predetermined codes. Positive emotions from engaged students during teacher-student conferences were apparent. There is no lack of engaged emotion

data to present because of the difficulty of accurately matching lack of engaged emotions with lack of engaged behaviors. I did not talk to students to know why they were not engaged.

### ***Conference Logs***

During teacher-student conferencing, the teacher was asked to record conference notes during or shortly after each separate conference. The teacher participant recorded handwritten notes on the provided research instrument tool (Appendix H). The research instrumentation stemmed from Sammons's (2010) Guided Math Conference Notes template, which was modified to fit the needs of this research design. The teacher participant was able to research what students knew about a certain skill or concept, provide them with specific feedback, and then teach to the student needs. This information was all recorded for each individual teacher-student conference. The conference log allowed the teacher participant to keep this information organized, as well as being orderly and structured for the coding process. Using the predetermined codes (Appendix I) and the Dedoose software, conference logs were coded and analyzed. Pertaining to student engagement, Table 15 displays descriptive details from the conference notes of the teacher participant.



**Table 15***Engaged Conference Log Notes*

Sixth-Grade engaged	Sixth-Grade lack of engagement	Eighth-Grade engaged	Eighth-Grade lack of engagement
3/23, “-counting incorrectly -worked on iReady lesson together”	4/8, “Absent quite a bit so caught her up -went over notes and examples”	4/14, “Using great vocabulary with explaining what was going on, -made him explain his answer to the class”	3/23, “(lazy)-tried to show her the other method”
3/24, “-he was not looking at the sign- then just ordering -then he noticed the sign but was saying -2 is larger than -1 -worked together on iReady lesson -drew a number line before and labeled”		4/14, “As she was completing activity, I could see she was picking up on scale factor”	4/14, “Playing around, -put his screen on the board so he would focus better”
4/26, “-preferred to use 3D figure for surface area, -forced him to use a net to solve a word problem with a net”		5/19, “I had asked her one question, she answered and then started asking herself guiding questions and figured it out!”	4/20, “-no clue—didn’t watch tutorial, Talked about one solution, no solution, and infinite (review) -practiced graphing equations, Systems of equations”
4/29 “Talked about how $V=Bh$ -she said can’t I just multiply all them”			
5/20, “We talked about choosing a number to make the statement true”			
5/20, “equally pour out” thought it meant multiply, Talked about different examples of word problems with multiply & divide”			

The above teacher notes, drawn from the conference logs, represent students involved in their learning environment. Whether students were talking with the teacher, explaining, or asking questions, the majority of the examples in Table 15 show engaged

students.

As for behaviors and emotions, the teacher notes were coded as engaged or lack of engagement and further categorized as behavior or emotion. Using the predetermined codes, Table 16 shows which behaviors and emotions were perceived by the teacher during conferences. The teacher did not indicate emotions in the notes of the conference logs; therefore, there are no data for emotions associated with engagement.

**Table 16**

*Behavior Conference Log Notes*

Engaged behaviors	Present	Lack of engagement behaviors	Present
Attention		Passivity	Yes
Focus		Giving up	
Involvement	Yes	Withdrawal	
Attempts	Yes	Unfocused	Yes
Effort		Inattentive	
Exertion		Distracted	
Action initiation	Yes	Unprepared	
On task	Yes	Absent	Yes
		Half-hearted	
		Off task	Yes

In Table 16, the data represents the teacher's perceptions of student behaviors during teacher-student conferencing. While conferences occurred or shortly after each conference ended, the teacher notated what took place during each session. Conference logs show that student behaviors were engaged and exhibited a lack of engagement, equally. Again, in the teacher participant's notes, there were no indications of emotions.

***Interview***

After journal entries and conference logs had been collected from the teacher participant, the two of us agreed upon a date and time for the focused interview. The interview took place virtually, which allowed for convenience between our two

schedules. Additionally, due to the format of the interview and with the teacher participant's agreement, I was able to record the detailed responses provided by the teacher participant. Interview questions (Appendix J) consisted of seven questions and were developed prior to the interview. Once the interview was complete, I was able to add the teacher participant's responses to the Dedoose software, where responses were coded using the predetermined codes (Appendix I). Descriptive responses are shown in Table 17, along with the corresponding interview question.

**Table 17**

*Engaged Teacher Quotes*

Interview question	Teacher response
2: What impacts did you see on student engagement because of teacher-student conferencing?	"Well I mean, just like I just said, like they were willing to participate more and they knew that, and it may not even have been something that they got right or they knew that they understood, I think once they realized how good it felt to answer in front of their peers and you know building that confidence they would try more of the difficult questions."
4: Were there other aspects of student learning that were influenced?	"I think that...I think just the effort increased also. I think, ya know, they knew my expectation, they knew what I wanted from them especially those last couple weeks. I had a lot of students that really didn't try as much the first couple months, they really pushed it and worked hard, and I'd equate that to having those conferences and building that relationship and they trusted me and they wanted to do well for me, and obviously for themselves too, but I think their effort increased a little bit, too."

Descriptive teacher quotes are included in Table 17 to represent meaning to interview questions regarding student engagement. Question 4 was also included to highlight the teacher participant's response specifically about effort. Effort was included in the predetermined codes under engaged behavior. The teacher participant briefly

referenced emotions in Question 2, as it indicates a positive emotion related to student engagement.

### **Student Achievement**

#### ***Teacher Journaling***

To restate, the teacher participant was asked to journal perceptions of the conferencing process, as well as student achievement. This occurred for the duration of the research phase. Journal entries were the insights and experiences of the teacher participant, with no prompting on when to write. The teacher participant chose to write weekly in most cases, with multiple entries included within the week. The handwritten entries included dates and grade-level information, which allowed the data to be coded and categorized by grade level. By means of predetermined codes (Appendix I) along with the Dedoose software, I read and coded each journal entry looking for evidence of student achievement. Table 18 illustrates descriptive samples from the teacher participant's journal entries connected to student achievement.

**Table 18***Achievement Teacher Quotes*

Sixth-Grade entries	Eighth-Grade entries	Both grades
<p>“Most students had a basic understanding of finding area. A few students struggled with more complex figures. I met with them and showed them my trick to remember the formulas.”</p> <p>“As we moved into surface area more students started struggling with understanding nets. I did not conference as much this week with them because quite a few had a hard time.”</p> <p>“For my groups who struggled, I worked with them on going backwards -- match solution with graph with one-step ineq. then we read different word problems.”</p> <p>“Based on the conferences, I knew that solving was not something I needed to spend a whole lot of time on, graphing very little, but main time spent on word problems and terms (how to know what sign to use).”</p> <p>“This week, we met and I noticed he was struggling with area and perimeter on the coordinate plane and ordering integers. We discussed creating a number line (basic and labeling it smallest to largest). This number line helped. As of 4/16 student has mastered standard!!”</p>	<p>“The ones I had to meet with the most were the ones who still struggle with graphing. Continued to remind them "b" begin and m is how you move. My students who understood the concept of finding solutions to systems, I showed them substitution method. A few did well.”</p> <p>“Students who had very little understanding I worked with them on the basics. This conferencing helped because I felt like it let them ask more questions that they normally wouldn't ask.”</p> <p>“With the students who understood the basics, I was able to take them a step further and had them work backwards, starting with a relative frequency table. This made them stretch their thinking.”</p> <p>“About 50% of the classes caught on and understood how dilations worked. I then had them conference with each other and that allowed more students to catch on.”</p> <p>“We finished out the week with dilations and I feel that they all really understood the concept!”</p>	<p>“I really enjoyed conferencing with my students. I was able to get honest answers to see if they understood what we were learning about.”</p>

(continued)

Sixth-Grade entries	Eighth-Grade entries	Both grades
<p>“Most students set up the problem correctly. For those who struggled, we talked about key terms in problems that tell us which operation. Then we talked about how to write it. After the problem was set up they knew how to solve.”</p> <p>“For my higher level students, I gave them two-step equations. Those few were able to set up the equation but couldn't solve.”</p> <p>“Once I told them that we move the term without the variable first, they picked up on it.”</p> <p>“They have done pretty good with solving equations but struggle with deciding what terms help me create the equations.”</p> <p>“So getting them to forget that they know the answer and having them prove with an equation is a struggle.”</p> <p>“We worked on conferencing about their benchmark. Not necessarily their scores but the question they got wrong.”</p> <p>“This conferencing helped my lower level students tremendously. I saw them really excel while doing their review assignment and answering the volume questions.”</p>	<p>“Hard topic for everyone to understand. Students did well with association but finding line of best fit was a struggle. I didn't do a whole lot of conferencing this week because of the huge struggle.”</p> <p>“Students did better this week with rotations. I worked with a few students who I felt could handle the next step with rotations- not something all students needed or would understand.”</p> <p>“I asked the students what they noticed about the coordinates after the rotation. All of them picked up on it right away.”</p> <p>“They understood that it would be a turn but struggled on the placement of the image.”</p> <p>“With the benchmarks, I was able to focus individually on areas of weakness or misconceptions. I saw more light bulbs go off with conferencing compared to going over it whole class. They took a quiz today with EOG style questions and they did so much better on the questions we conferenced about.”</p>	

Table 18 includes multiple teacher quotes from the teacher participant's journal entries that support student achievement. The teacher participant was able to identify

strengths, weaknesses, areas of improvement, or even areas of celebration through the journaling process and teacher-student conferences. In a follow-up discussion with the teacher participant, it was further explained that the teacher decided who to conference with based on class assessment data and classroom observations. The teacher participant added that students were nervous to ask for conferences, but the teacher participant often surveyed students and would also select who to conference with based on survey results.

### ***Observations***

Once more, observations took place throughout the research period. During the observations, signs of student achievement were also looked for. I was able to observe both sixth-grade classes and both eighth-grade classes. As time was spent looking for evidence of student achievement, observations produced a different perspective for student achievement data. Since the study was not focused on quantitative measures but on qualitative measures, student grades or diagnostic scores were not the focus. The data that were produced resulted from the types of conferences the teacher participant held with students. These types or categories of conferences centered around improving student skills and understanding of mathematics; that is student achievement. Sammons's (2014) Guided Math Conferences categories were provided to the teacher participant prior to implementation as a quick reference (Appendix G) for the conferencing process. Many of these conference types were observed and are shown in Table 19.

**Table 19***Observation Student Achievement Data*

Conference category	Observable	Grade level
Compliment conference	No	No
Comprehension conference	Yes	6 & 8
Skill conference	Yes	6 & 8
Problem-solving conference	Yes	8
Self-assessment and goal-setting conference	No	
Recheck conference	No	

As seen in Table 19, the teacher participant held one-on-one teacher-student conferences that aligned with the goal of student achievement. These observable conferences assessed student comprehension, extended skills, and strategies, as well as reinforced learning towards certain grade-level content. The teacher participant provided these opportunities to both grade levels and multiple students, as seen during the observations.

***Conference Logs***

Again, conference logs were utilized to analyze data but also related to student achievement. Conference logs allowed the teacher participant to record notes about each individual teacher-student conference. The conference log provided an organized space for the teacher participant to capture student understanding, feedback, and teaching points related to student needs. The teacher participant was able to complete 78 total conferences with different sixth and eighth graders, with each one recorded on the conference logs. These data were read again but through the lens of student achievement and coded using predetermined codes (Appendix I). Of the 78 total conferences, 67 entries matched the achievement code. Table 20 highlights the matches for each individual achievement code from the teacher participant's conference log notes. Some



entries matched multiple codes depending on the teacher's notes.

**Table 20**

*Achievement Conference Log Notes*

Achievement code	Number of matches
Proficient	6
Not proficient	15
Comprehensive understanding	3
Thorough understanding	4
Sufficient understanding	11
Inconsistent understanding	28
Above	7
Below	8
On grade level	0
Not on grade level	0
Goals	0
Objectives	0
Learning targets	0
Growth	6
Accomplished	0
Met	0
Not met	0

The achievement codes, as seen in Table 20, allow you to see the overall picture for mathematical understanding for both grade levels. The teacher participant was able to distinguish student understanding during the research step of each conference and then clearly describe her perceptions through writing notes, which were coded and presented. Additionally, specific teacher quotes concerning student achievement from the teacher's conference logs are showcased in Table 21.

**Table 21***Student Achievement Conference Log Notes*

Sixth-Grade conference logs	Eighth-Grade conference logs
Above, 3/19, Advanced, gave student two step equation, he could tell me the steps to find the answer, solving was difficult, Great job setting it up	Advanced, 3/19, Able to trans. & reflect, showed rotation, knew it was a turn but couldn't come up with new image placement
Below, 3/19, great job setting up, knew vocab, struggled w/ solving	Average, 3/19, Understood translation, struggled w/ reflection
Average, 3/19, great w/ setting up & solving, didn't need to help, will give more advance next time	Above, 3/23, He did well with turn. Coordinate plane and then resetting, *showed him next step—clicked right away!
Average, 4/6, he understood that it is similar to solving equations, gave him 2 word problems (one w/ an easy inequality term and one that is more difficult)—easy one was good, hard one was a struggle (at least)	Above, 3/19, able to translate and reflect, showed rotation, knew it was a turn “looked almost flipped”
Low, 4/6, struggle with solving, graphing came easy after I showed him the trick, similar to equations; also struggled	Advanced, 3/19, Able to translate & reflect, Showed rotation, figured out it was a turn b/c of the vertices
4/12, had a hard time getting going, couldn't come up with a match between word problem and inequality set up, this really helped and showed more groups, this also helped with seeing if our solution was logical	3/19, Knows what happens w/ each but struggles with new image, Translation—showed a picture with preimage and new image—asked what happened so he counted—Great!
4/22, could identify the 5 shapes and how to find area of square & rectangle, but not parallelogram or trapezoid or triangle	4/22, No clue what to do, -talked about $y=mx + b$
4/26, -introduce SA, she did well w/ understanding parts of the net, struggled with labeling values	4/28, No idea how to fill in table, -focused on what numbers they gave us and looked at each column and row individually
4/29, Did great with formula, gave her some word problems to work with and going backwards	4/28, Did well with tables -struggled with finding percents, -reminded him percent part/whole X 100
5/3, Did pretty well, had to remind her about dividing by 2 with a triangle	5/19, Didn't have a solid understanding of interval, gave an example was able to answer her 2 she got wrong

The teacher quotes presented in Table 21 are just a sample of the 67 entries that matched the achievement code. Ten quotes are presented for sixth grade, and 10 quotes are presented for eighth grade. These quotes are simply excerpts from each completed conference log entry. The teacher participant's quotes represent student achievement for that specific moment in time and the student's understanding of the current content being discussed.

### ***Interview***

The focused interview occurred once data had been collected from the teacher participant and the school year was ending. Journal entries, conference logs, and observational data were all then in my possession. To enhance my data, I met with the teacher participant virtually to ask specific interview questions (Appendix J). I asked seven interview questions, all developed prior to the interview. The virtual setting allowed the opportunity for the interview to be recorded, to which the participant agreed, but also to easily code using the predetermined codes and to effortlessly revisit as often as needed. Table 22 features the interview questions related to student achievement and the descriptive responses from the teacher participant.

**Table 22***Student Achievement Teacher Quotes*

Interview question	Teacher response
3: What impacts did you see with student achievement because of teacher-student conferencing?	<p>“I think especially towards the end when we started doing a lot of like the review in both my grade levels, you know they would ask a question and then they kind of would answer that question themselves, all they needed to do was get that question out, and then they knew what I was going to ask them, not really necessarily tell them the steps, but they knew how I was going approach those questions that they may have and were able to answer them on their own and correctly, so I think that really was beneficial.”</p> <p>“There were a couple students that I could see with their EOG scores, the ones I was able to meet with more often, to me their EOG score was higher than what I expected.”</p> <p>“All I could really base it off of was what I saw in my classroom in the beginning, so I think with those conferences, ya know like I said, their confidence, their ability to answer those questions on their own, really helped that achievement and their scores, I feel.”</p>
4: Were there other aspects of student learning that were influenced?	<p>“I think that...I think just the effort increased also. I think, ya know, they knew my expectation, they knew what I wanted from them especially those last couple weeks. I had a lot of students that really didn't try as much the first couple months, they really pushed it and worked hard, and I'd equate that to having those conferences and building that relationship and they trusted me and they wanted to do well for me, and obviously for themselves too, but I think their effort increased a little bit, too.”</p>

The interview process provided detailed responses from the teacher participant concerning student achievement, which are presented in Table 22. The teacher's perceptions indicate encouraging impacts regarding student achievement, especially from the responses to Question 3. As a reminder, the EOG is a state standardized test taken at the end of the school year. The EOG determines proficiency towards grade-level

standards, as well as serves as a measure for student growth.

### **Emergent Themes**

One theme that emerged from journal entries was the recurrence of vocabulary. This use of vocabulary was by the teacher. It was written by the teacher as terminology, vocab, vocabulary, terms, or key terms. Vocabulary was not a predetermined code for student engagement or student achievement. Of 16 journal entries, this vocabulary theme appeared in seven journal entries, which is 43.75%. This was close to half of the teacher participant's entries. The use of vocabulary relates to student understanding of the language of mathematics, which could be associated with achievement. A descriptive sample of the teacher participant's quotes can be found in Table 23.

**Table 23**

#### *Vocabulary Teacher Quotes*

Sixth-Grade entries	Eighth-Grade entries
"They have done pretty good w/ solving equations but struggle w/ deciding what terms help me create the equation."	"Most of them used the correct terminology (translation-slide, reflection-flip)."
"For those who struggled, we talked about key terms in problems that tell us which operation."	"I started the topic out w/ a desmos activity to preview the topic & vocab."
"Then looked at the symbol and term or words in problem (eliminated options)."	"With this I was able to conference with individuals and partners and talk about the vocab and what was happening through each slide."
	"The conversations focused on vocabulary and really trying to figure out how to answer the questions."

Another theme that emerged from the data was a reiteration of student confidence. This appeared in multiple journal entries and from the focus interview. Student

confidence was not a predetermined code for student engagement or student achievement. Quotes from the teacher participant's journal entries included, "this also boosts their confidence when answering questions and asking me questions," and "met before we started, that way they could participate more. This helped build confidence!!" From the interview with the teacher participant, additional evidence surfaced. Table 24 includes responses from the teacher participant during the interview.

**Table 24**

*Student Confidence Teacher Quotes*

Interview question	Teacher response
1: Will you explain the highlights of teacher-student conferencing?	"Me knowing that they understood it, I would, could call on them in class and I knew that because that they knew that they knew it, they would be more confident answering those questions and willing to answer those questions during class time in front of their peers."
2: What impacts did you see on student engagement because of teacher-student conferencing?	"They were willing to participate more, um, and they knew that, and it may not even have been just something that they got right, or they knew that they understood, I think once they realized how good it felt to answer in front of their peers and ya know building that confidence they would try more of the difficult questions."
3: What impacts did you see with student achievement because of teacher-student conferencing?	"All I could really base it off of was what I saw in my classroom in the beginning, so I think with those conferences, ya know like I said, their confidence, their ability to answer those questions on their own, really helped that achievement and their scores, I feel."

The emergent themes, as seen in Table 23 and Table 24, circle back to the idea of

themes naturally appearing from the data. These themes could not be ignored. The prevalence of these data was too obvious not to present the findings. Vocabulary and student confidence were not predetermined codes prior to research but justified a significance to the study and potential impact on student engagement and with student achievement.

### **Triangulation**

Multiple data sources have been applied in this research study. The purpose of using teacher journaling, observations, and conference logs was to help increase the validity of the findings. By using multiple data tools, in addition to holding a focused interview, each diverse tool has helped reveal different discoveries during the analysis process. With the ability to map out and cross-reference each tool's findings, making meaning and drawing conclusions to the study were achievable.

### **Summary**

In this case study, a rich source of qualitative data from several sources was collected. Qualitative data provided insight into the teacher participant's perceived impact of teacher-student conferencing on student engagement and with student achievement. The teacher participant provided data through journal entries and conference logs. The teacher also provided qualitative feedback through an interview at the end of the research. In addition, observations provided anecdotal notes of the teacher participant conducting teacher-student conferences. The qualitative data were coded to provide patterns and themes. This all-encompassing collection of data builds the foundation for the conclusions presented in Chapter 5.

## **Chapter 5: Discussion**

### **Summary of Study**

Educators observing students in American schools and classrooms often question why students struggle with understanding mathematics. Students are often compared to students in different countries, states, or even students in the same district. Scores and numbers tend to be the primary topic, yet we never focus on what our students have to say. What are our students telling us about their understanding of mathematics? What conversations are occurring between teachers and students? What are we as a math and educational community doing to make a change? Through this limited qualitative study, I sought to explore this understanding and mathematical meaning-making through the lens of one intensive case.

To explore the possibility of revealing a successful instructional method to address math achievement, I set out to study teacher-student conferencing in middle grades mathematics classrooms. After reviewing extensive literature and reading relative studies, I designed a qualitative approach to investigate the impact of teacher-student conferencing on student engagement and with student achievement. The research was designed as a case study to capture the perceptions of the teacher participant. Instrumentation for the research included teacher journaling, conference logs, observations, and an interview.

Multiple teachers across three grade levels, sixth through eighth, in a southeastern North Carolina public school district were sought out to participate in the study. After many efforts and communication with various math teachers, one teacher agreed to volunteer for the study. This transpired into an in-depth case study as I had the ability to



focus entirely on the process of teacher-student conferencing, one teacher participant, and the qualitative data that were produced from the research tools. Over 9 weeks, the teacher participant carried out conferences with sixth- and eighth-grade students. Perceptual data were needed and anticipated to answer the research questions. The research questions that guided this study were

1. What is the impact (as perceived by the teacher) of teacher-student conferencing on student engagement?
2. What is the impact (as perceived by the teacher) of teacher-student conferencing with student achievement?

The following sections include an interpretation of the findings, a review of emergent themes, limitations of the study, delimitations of the study, suggestions for future studies, and the conclusion.

### **Interpretation of Findings**

#### ***Research Question 1: What Is the Impact (as Perceived by the Teacher) of Teacher-Student Conferencing on Student Engagement?***

Outcomes related to Research Question 1 were encouraging. Findings suggest that students were active participants in teacher-student conferences. The positive impact of teacher-student conferences was that students not only exhibited specific behaviors and emotions, but students also started asking more questions in class and began taking initiative during independent work. Based on the teacher's journals, conference logs, and responses to interview questions, the teacher participant described clear engagement. I also observed multiple conferences and witnessed high student engagement during the one-on-one process between the teacher and student.

This finding is consistent with the literature, indicating that students were attentive and engaged based on the four questions from Marzano and Pickering's (2011) engagement model: "How do I feel," "Am I interested," "Is this important," and "Can I do this?" Specifically related to Question 3, "Is this important," and Question 4, "Can I do this," students felt the conferences were important and they were able to tackle tasks and concepts with attempts, effort, and initiation. Since Question 4 is directly related to student self-efficacy, it is suggested that teachers have the ability to enhance student self-efficacy by tracking and studying progress and the use of verbal feedback (Marzano & Pickering, 2011); all of which the teacher participant did. Finally, building on positive teacher-student relationships daily affects how students respond to Question 1, "How do I feel," which then influences engagement (Marzano & Pickering, 2011).

**Emergent Themes.** The first emergent theme from Research Question 1 was that of student confidence. In many instances throughout the teacher's journal entries and the interview responses, student confidence distinctly surfaced. There is support for the emergent theme in literature, indicated by the positive relationships, due to the teacher's actions of physical contact and gestures. This is supported by Marzano and Pickering's (2011) idea of teacher-student relationships being crucial to students feeling good about being in the teacher's classroom. These gestures included providing eye contact, laughing with students, nodding, and physical proximity, all of which were observed during my observations. This evidence of interest in students was then immediately reciprocated by students during the conferences. Students displayed some of the exact behaviors of head nodding, giggling, smiling, and standing close to the teacher. It was evident that students felt safe, and there were respectful interactions as well as fair and equitable treatment of

all students (Marzano & Pickering, 2011). Because students felt safe and supported, student confidence inspired the students to participate more in class, take risks in front of peers, and fully engage with the teacher during conferences. This too is consistent with the literature, indicating that the teacher fostered positive relationships with students, which created classroom environments more conducive to learning and meeting students' developmental, emotional, and academic needs (Rimm-Kaufman & Sandilos, 2010).

***Research Question 2: What Is the Impact (as Perceived by the Teacher) of Teacher-Student Conferencing With Student Achievement?***

The next finding, relating to Research Question 2, was that the teacher participant was able to intentionally address inconsistent student understanding of the content. The teacher participant was able to research and assess student understanding and then teach to the student needs. This finding is consistent with the literature, as the conferencing process was grounded in the Guided Math framework. The specific conference structure enabled the teacher to carry out the major functions of assessment, feedback, and instruction (Sammons, 2014). This also indicates that the process of teacher-student conferencing is a social practice, supported by social constructivism (Vygotsky, 1978). When students took part in conferring with the teacher, the ZPD was activated. Student learning and development occur independently, but when under the guidance of the teacher, learning and development had the potential of growing even more (Vygotsky, 1978).

Additionally, where conference logs provided each individual lens into student achievement, teacher journal entries provided a larger scope for whole class understanding. Through conferencing and the assessment of individual understanding, the

teacher participant was able to change and cater instruction to the overall needs of the class. This is evident in the teacher participant's journal entries and is supported by the literature. As suggested by Earl (2013), assessment for learning enabled the teacher's use of multiple data points to modify opportunities and instruction for learning. Furthermore, conferences acted as formative assessments; through the use of conference logs and journal entries, the teacher participant was able to reflect on conferring data, plan for how to respond, and then respond through instruction (Munson, 2018). Again, consistent with the literature, assessments provided evidence of proficiency with math content and practice, informed feedback to students, as well as instructional decisions (NCTM, 2014).

Also, the feedback data provided from conference logs are consistent with the literature. Not only was the feedback specific and differentiated to the individual, but the feedback was timely, occurring during the conference and not after it, which is considered most effective (Sammons, 2014). Further, when Sammons (2014) characterized effective feedback, 10 characteristics were outlined and described. From the conference log data, it was evident that the teacher participant's feedback during all teacher-student conferences checked off at least six of the 10 effective feedback characteristics. Likewise, whether the teacher was using feedback from the students to make appropriate instructional adjustments (Hattie et al., 2017) or student responses were acting as feedback for student understanding (Almarode et al., 2019), feedback was a mutual give-and-take action, constantly and naturally occurring during teacher-student conferences.

Lastly, building relationships with students had a positive influence on student learning and is consistent with the literature. From Interview Question 1, the teacher

participant explained the first highlight was building relationships with students from being able to meet one-on-one. The teacher stated that conferences in the beginning did not always have to be about the math learned that day, but that short conversations helped when the teacher did conferences about math. The teacher stated that building the relationships allowed trust to occur quicker, students to be themselves, and honest responses to be given from the students, which in turn allowed the teacher to see their true struggles. The relationships formed also allowed the teacher to provide positive feedback to students when students were able to understand concepts correctly. This is supported by Sammons's (2014) value of building relationships, that students were afforded one-on-one time with the teacher, as one mathematician sharing their thinking to another, which sent a clear message of care, respect, and concern for student success. Lastly, as Hattie's (2009) findings on student learning suggested, teacher-student relationships resulted in an effect size of  $d=0.72$ , which is considered influential to student learning since it is greater than 0.40.

**Emergent Themes.** The teacher-student conferencing process allowed the teacher participant time to assess, discuss, review, and model academic vocabulary with both sixth- and eighth-grade math students. The teacher participant wrote, "Talking with them one on one has helped me focus on highlighting the terms." This second emergent theme was important because of the positive influence it had with student achievement, specifically in understanding mathematics. Through talking with students and listening to student thinking and explanations, the teacher participant researched student understanding, determined the teaching point, and intentionally taught to the student needs. In many cases, academic vocabulary was the teaching point during the

conferencing process. This was in addition to process and/or computation skills. This finding is consistent with the literature, indicating that teacher-student conferences encouraged mathematical communication (Sammons, 2014). The teacher was able to model specific vocabulary so students could in return communicate effectively using content vocabulary during conferences and/or class time.

It is important to note here that writing and reading conferences have been around for decades, all highlighted through the work of well-known gurus; however, math conferencing is almost imaginary or nonexistent. It took time and exploration to find math gurus such as Sammons and Munson who encourage and value math conferencing with students. So to witness such a worthy theme emerge and unfold from the data helps to show the impact of understanding content vocabulary and understanding mathematics. The need for a language and literacy framework within content areas (Fountas & Pinnell, 2001) is supported by the emergent theme, which is consistent with literature.

### **Limitations of Study**

Limitations were presented in Chapter 1, yet during the process, an additional limitation shadowed the research process. To review, one limitation of the study was the number of teacher participants. Teacher participants were selected on a volunteer basis. Sixth-, seventh-, and eighth-grade teachers within a southeastern North Carolina school district were emailed research information. Participants were solely selected based on teacher interest; therefore, the number of teacher participants and what grade level they taught was out of my control as the researcher.

Another limitation was the age range of students. Students ranged in age anywhere between 11 years of age and 14 years of age. The age range happened to be a

convenience sample due to the grade levels the teacher participant taught. The teacher participant taught two classes of sixth graders and two classes of eighth graders.

An unforeseen limitation that transpired was the COVID-19 pandemic along with state and district responses to the event. Many changes occurred to daily schedules and routines that were out of my control; however, during this research study, the teacher participant had the necessary tools and the option of implementing conferencing virtually, if needed. It should be stated though, that all conferences occurred face-to-face and were for the convenience of the teacher participant. To add to this limitation, the timeline for research could be affected if not in a pandemic situation. It is possible that research could take place over an even greater amount of time, if not constrained by multiple schedule and routine changes.

### **Delimitations of Study**

The results of this study are from one teacher participant, one middle school, and one district, all within one state. It is possible that a larger scope for research could potentially yield different findings. As the researcher, I chose to conduct this research only with middle grades mathematics teachers, which was a delimitation of the study. This choice was made because of my teaching experience and education licensure; however, if the study were to be replicated again, it could be suggested that different grade levels be targeted. High school mathematics classes and elementary mathematics classes could provide comparable or contrasting findings for various grade-level teachers or stakeholders.

A second delimitation of the research was that the study only took place within one school district. The rationale for selecting one school district was that the district is a

convenience sample but also for an opportunity to offer district stakeholders with findings of the study. Again, if the study is repeated, research could take place across multiple districts at the same time. Findings could be analyzed, compared, and reported to provide a larger range of results.

Finally, I specifically chose Sammons's (2014) Guided Math Conferencing framework as a validated design for my research. It is understood that my findings may yield certain conclusions as a result of utilizing this particular framework. It is also understood that there may be other frameworks or models that research studies could be designed around or grounded in for related research.

### **Suggestions for Future Studies**

There are multiple suggestions for what might be implemented in future studies. First, if this case study were to be replicated once more, it is greatly advocated that research occur during a traditional school year instead of during a worldwide pandemic. State mandates, district mandates, teacher stress, and expectations, in addition to uncharted routines with schedules and cohorts, may yield similar or changed results. It is also possible that more teachers would be likely to react and volunteer for research in a non-pandemic school year. It is suggested that the research be reproduced with a larger sample size. Additional teachers, a variety of middle schools, and different districts could add to the findings of this research. A larger scope could benefit a larger audience. This recommendation may also affect the timeline of future research. If teacher-student conferencing was carried out in an ordinary school year, it is possible that research could take place over a longer period.

Another suggestion was generated from the interview process. Through



conversations with the teacher participant, it was suggested by the teacher participant that both the teacher and student be provided sentence stems or starters for conferring. If teachers do not feel confident with starting the conferring process or do not know what questions to ask, sentence stems could be a jumpstart to help with the routine and asking specific questions for different types of conferences. This idea could be beneficial to students, too. If students are hesitant to respond to the teacher during the conference process, sentence stems may help guide their thinking or even build confidence to answer. Sentence stems would allow the student to see a list of options, in which the student would then choose an option to start their response to the teacher versus not responding at all. Since this is suggested, the recommended research might look different, too. A future researcher could look at the differences between when sentence stems are provided and when they are not to see the potential impact on teacher-student conferencing.

One more suggestion derived from the interview. This suggestion is the reinforcement of getting into a routine of conferencing with students. When I asked what recommendations the teacher participant would give to other math teachers, the teacher participant eagerly stated, “Do it,” but went on further to say,

I think that making sure to put the effort and the time, set aside time in your class to do them...write a note on your computer, or on the board, or schedule it out, or anything like that would be beneficial in the future.

The teacher participant described that during the first couple of weeks because the teacher was not used to conferencing, the teacher had to think about meeting with students, but once the rhythm and routine fell into place, it became easier to conference

with students. Again, because this is a suggestion for what could be implemented in a future study, the recommended research might look different. A future researcher could study how establishing a routine and procedures impact the conferring process.

## **Conclusion**

The purpose of this qualitative case study was to contribute to the larger discussion of math improvement in an effort to address math proficiency. This study followed the grounded theory of the Guided Math framework, specifically conferencing, which resulted in collecting qualitative data. By understanding teacher perceptions of the impact of teacher-student conferencing on student engagement and with student achievement, this study had two main findings and two emergent findings:

1. Teacher-student conferencing influences student engagement.
2. Teacher-student conferencing influences student achievement.
3. Teacher-student conferencing influences student confidence.
4. Teacher-student conferencing influences content vocabulary.

Even though COVID-19 and the situations were unescapable and participation in the study was not what I envisioned, I am beyond thankful for the teacher who did volunteer for the study. Student-teacher conferencing can provide opportunities for meaningful mathematical experiences for our students. It is best summarized when I asked the teacher participant during the interview if there were any aspects of conferencing that were not helpful. As the teacher participant stated, “I don’t think anything. I think there’s only positives that you can get from that...there’s nothing that could be negative about it. In my experience, there was nothing negative!” Through this one case, the outcomes for students and the teacher were positive and improved student

confidence and performance in mathematics and should be noted by all math educators interested in improving student performance.

## References

- Almarode, J., Fisher, D., Assof, J., Hattie, J., & Frey, N. (2019). *Teaching mathematics in the visible classroom*. Corwin.
- Anderson, C. (2018). *A teacher's guide to writing conferences*. Heinemann.
- Black, P., Harrison, C., Lee, C., Marshall, B., & William, D. (2003). *Assessment for learning: Putting it into practice*. Open University Press.
- Camera, L. (2019). *U.S. students show no improvement in math, reading, science on international exam*. U.S. News & World Report.  
  
<https://www.usnews.com/news/education-news/articles/2019-12-03/us-students-show-no-improvement-in-math-reading-science-on-international-exam>
- Carey, J., Howard, C., & Leftwich, R. (2013). *Improving elementary students' engagement during independent reading through teacher conferencing, teacher modeling, and student choice*. <https://files.eric.ed.gov/fulltext/ED541338.pdf>
- Creswell, J. (2018). *Research design qualitative, quantitative, and mixed methods approaches* (5<sup>th</sup> ed.). Sage.
- Danielson, C. (2006). *Teacher leadership that strengthens professional practice*. ASCD.
- Drago-Severson, E. (2009). *Leading adult learning: Supporting adult development in our schools*. Corwin Press.
- Earl, L. (2013). *Assessment as learning: Using classroom assessment to maximize student learning* (2<sup>nd</sup> ed.). Corwin.
- Fountas, I., & Pinnell, G. (2001). *Guiding readers and writers*. Heinemann.
- Hattie, J. (2009). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. Routledge.

- Hattie, J., Fisher, D., & Frey, N. (2017). *Visible learning for mathematics: What works best to optimize student learning*. Corwin.
- Kittle, P. (2013). *Book love: Developing depth, stamina, and passion in adolescent readers*. Heinemann.
- Marzano, R., & Pickering, D. (2011). *The highly engaged classroom*. Marzano Research Laboratory.
- Marzano, R., Pickering, D., & Pollock, J. (2001). *Classroom instruction that works: Research-based strategies for increasing student achievement*. ASCD.
- Munson, J. (2018). *In the moment: Conferring in the elementary math classroom*. Heinemann.
- National Assessment of Educational Progress. (2021). *The nations report card*. National Center for Education Statistics.
- [https://www.nationsreportcard.gov/profiles/stateprofile/overview/NC?cti=PgTab\\_Findings&chort=1&sub=MAT&sj=NC&fs=Grade&st=MN&year=2019R3&sg=Gender%3A+Male+vs.+Female&sgv=Difference&ts=Single+Year&tss=2019R3&sfj=NP](https://www.nationsreportcard.gov/profiles/stateprofile/overview/NC?cti=PgTab_Findings&chort=1&sub=MAT&sj=NC&fs=Grade&st=MN&year=2019R3&sg=Gender%3A+Male+vs.+Female&sgv=Difference&ts=Single+Year&tss=2019R3&sfj=NP)
- National Council of Teachers of Mathematics. (2014). *Principles to actions: Ensuring mathematical success for all*. The National Council of Teachers of Mathematics, Inc.
- North Carolina Department of Public Instruction. (2022a). 2018-2019 *Achievement level results*. <https://www.dpi.nc.gov/documents/achievement-level-results-2018-2019>
- North Carolina Department of Public Instruction. (2022b). *Achievement level descriptors*. Retrieved May 23, 2022, from <https://www.dpi.nc.gov/media/6902/open>

- Richards, E. (2020). *Math scores stink in America. Other countries teach is differently- and see higher achievement.* USA Today.  
<https://www.usatoday.com/story/news/education/2020/02/28/math-scores-high-school-lessons-freakonomics-pisa-algebra-geometry/4835742002/>
- Rimm-Kaufman, S., & Sandilos, L. (2010). *Improving students' relationships with teachers.* American Psychological Association.  
<http://www.apa.org/education/k12/relationships>
- Roorda, D., Koomen, H., Spilt, J., & Oort, F. (2011). The influence of affective teacher-student relationships on students' school engagement and achievement: A meta-analytic approach. *Review of Educational Research*, 81(4), 493-529.  
[www.jstor.org/stable/41408670](http://www.jstor.org/stable/41408670)
- Sammons, L. (2010). *Guided math: A framework for mathematics instruction.* Shell Education.
- Sammons, L. (2014). *Guided math conferences.* Shell Education.
- Skinner, E. A., Kindermann, T. A., Connell, J. P., & Wellborn, J. G. (2009). Engagement and disaffection as organizational constructs in the dynamics of motivational development. In K. R. Wentzel & A. Wigfield (Eds.), *Handbook of motivation at school* (pp. 223-246). Routledge.
- Snyder, A. T. (2016). *Effects of graphing, goal setting, and conferencing on reading and math achievement* (Publication No. 10011009) [Doctoral dissertation, Capella University]. ProQuest Dissertations & Theses Global.

- Sutherland, G. L. (2017). *Student goal setting conferences and the effects on student achievement* (Publication No. 10605890) [Doctoral dissertation, University of St. Francis]. ProQuest Dissertations & Theses Global.
- Venezky, E. (2018). *Why U.S. students are bad at math*. U.S. News & World Report.  
<https://www.usnews.com/news/best-countries/articles/2018-05-04/commentary-heres-why-the-united-states-is-so-bad-at-math>
- Vygotsky, L. S. (1978). In M. Cole et al. (Eds.), *Mind in society: The development of high psychological processes*. Harvard.
- Wolpert, S. (2018). *Why so many U.S. student aren't learning math*. University of California, Los Angeles. <https://phys.org/news/2018-10-students-math.html>

**Appendix A**  
**NC State Testing Results**



**Table 1a. 2018–19 End-of-Grade General Test and Alternate Assessments Results**  
**Statewide Percent of Students at Each Achievement Level by Grade**  
**Mathematics**

Achievement Levels/Generic Descriptors		Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
<b>Not Proficient</b>							
Students who are Not Proficient demonstrate inconsistent understanding of grade level content standards and will need support.	<b>General Test</b>	35.5%	42.5%	39.5%	41.0%	41.5%	64.3%
	<b>NCEXTENDI</b>	56.1%	58.5%	63.6%	58.3%	52.5%	67.2%
<b>Level 3</b>							
Students at Level 3 demonstrate sufficient understanding of grade level content standards, though some support may be needed to engage with content at the next grade/course.	<b>General Test</b>	20.0%	17.6%	18.2%	17.2%	13.9%	16.0%
	<b>NCEXTENDI</b>	37.3%	35.2%	28.7%	36.0%	42.2%	25.9%
<b>Level 4</b>							
Students at Level 4 demonstrate a thorough understanding of grade level content standards and are on track for career and college	<b>General Test</b>	30.7%	25.4%	30.8%	29.8%	31.5%	14.0%
	<b>NCEXTENDI</b>	6.7%	6.3%	7.7%	5.6%	5.3%	6.9%
<b>Level 5</b>							
Students at Level 5 demonstrate comprehensive understanding of grade level content standards, are on track for career and college, and are prepared for advanced content at the next grade/course.	<b>General Test</b>	13.8%	14.6%	11.5%	12.1%	13.1%	5.7%

Notes: Percents are rounded to the nearest tenth. Due to rounding, data may not sum to 100.0 percent.

Full descriptions of achievement level ranges are located at <http://shepolicy.dpi.state.nc.us/>

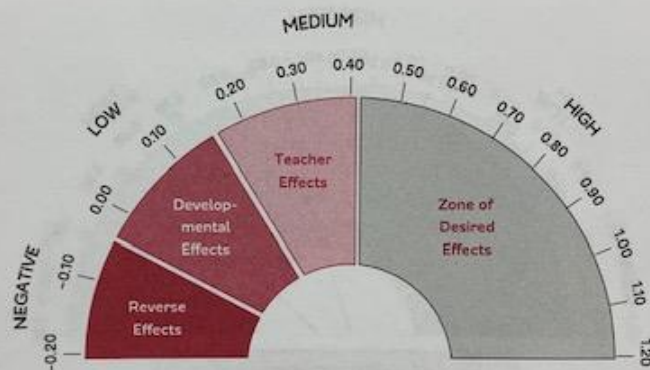
Performance data are masked when results are less than or equal to 5.0 percent, or greater than or equal to 95.0 percent

Data received from local education agencies, charter schools, and regional school after November 4, 2019 are not included in this table.

Prepared by the NCDPI Division of Accountability Services/North Carolina Testing Program

**Appendix B**  
**Barometer of Influence**

## THE BAROMETER OF INFLUENCE



Source: Adapted from Hattie, J. (2009). *Visible Learning: A Synthesis of Over 800 Meta-Analyses Relating to Achievement*. Figure 2.4, page 19. New York, NY: Routledge.

Figure 1.1

**Appendix C**  
**High Impact Approaches**

## HIGH-IMPACT APPROACHES AT EACH PHASE OF LEARNING

Surface Learning		Deep Learning		Transfer Learning	
Strategy	ES	Strategy	ES	Strategy	ES
Imagery	0.45	Inquiry-based teaching	0.40	Extended writing	0.44
Note taking	0.50	Questioning	0.48	Peer tutoring	0.53
Process skill: record keeping	0.52	Self-questioning	0.55	Synthesizing information across texts	0.63
Direct/deliberate instruction	0.60	Metacognitive strategy instruction	0.60	Problem-solving teaching	0.68
Organizing	0.60	Concept mapping	0.64	Formal discussions (e.g., debates)	0.82
Vocabulary programs	0.62	Reciprocal teaching	0.74	Organizing conceptual knowledge	0.85
Leveraging prior knowledge	0.65	Class discussion: discourse	0.82	Transforming conceptual knowledge	0.85
Mnemonics	0.76	Outlining and transforming notes	0.85	Identifying similarities and differences	1.32
Summarization	0.79	Small-group learning 0.47			
Integrating prior knowledge	0.93	Cooperative learning 0.40			
		Teacher expectations 0.43			
		Feedback 0.70			
		Teacher clarity 0.75			
		Integrated curricula programs 0.47			
		Assessment-capable visible learner 1.33			

Source: Adapted from Almarode, Fisher, Frey, & Hattie (2018).

Figure 1.3

**Appendix D****NCTM Mathematics Teaching Practices**

## Mathematics Teaching Practices

**Establish mathematics goals to focus learning.** Effective teaching of mathematics establishes clear goals for the mathematics that students are learning, situates goals within learning progressions, and uses the goals to guide instructional decisions.

**Implement tasks that promote reasoning and problem solving.** Effective teaching of mathematics engages students in solving and discussing tasks that promote mathematical reasoning and problem solving and allow multiple entry points and varied solution strategies.

**Use and connect mathematical representations.** Effective teaching of mathematics engages students in making connections among mathematical representations to deepen understanding of mathematics concepts and procedures and as tools for problem solving.

**Facilitate meaningful mathematical discourse.** Effective teaching of mathematics facilitates discourse among students to build shared understanding of mathematical ideas by analyzing and comparing student approaches and arguments.

**Pose purposeful questions.** Effective teaching of mathematics uses purposeful questions to assess and advance students' reasoning and sense making about important mathematical ideas and relationships.

**Build procedural fluency from conceptual understanding.** Effective teaching of mathematics builds fluency with procedures on a foundation of conceptual understanding so that students, over time, become skillful in using procedures flexibly as they solve contextual and mathematical problems.

**Support productive struggle in learning mathematics.** Effective teaching of mathematics consistently provides students, individually and collectively, with opportunities and supports to engage in productive struggle as they grapple with mathematical ideas and relationships.

**Elicit and use evidence of student thinking.** Effective teaching of mathematics uses evidence of student thinking to assess progress toward mathematical understanding and to adjust instruction continually in ways that support and extend learning.

## **Appendix E**

### **Initial Teacher Participant Email**



## Potential Participant Letter

Good morning!

My name is Natalie Ostrander and I am an instructional coach at \_\_\_\_\_. I have taught in this district for ten years with a focus in mathematics and science. I am also a doctoral candidate at Gardner-Webb University seeking a doctorate in Curriculum and Instruction. As part of the degree requirements candidates must successfully defend a dissertation. I have chosen to look at the effect of teacher-student conferencing in middle grades mathematics classrooms. The district has approved my research topic, and I am looking for participants who would like to take part in my study.

Here are a few details regarding the initial phases of my dissertation.

My research questions ask:

1. What is the impact (as perceived by teachers) of teacher-student conferencing on student engagement?
2. What is the impact (as perceived by teachers) of teacher-student conferencing with student achievement?

I am looking for 6th, 7th, or 8th grade teachers that would be willing to participate in a cross-case analysis (case study) where you would be asked to implement conferencing. Participants will record their thoughts using a journaling process, log conference notes, as well as allow me to visit the classrooms. At the end of research, I will hold a virtual focus group to allow open discussion with all teacher participants based on a developed set of questions.

Participation by teachers would be optional and strictly on a volunteer basis. I will NOT be collecting student data but asking teachers to formulate descriptions about students through journaling, nor will I be speaking to students directly. The entire basis of my study will involve teacher perceptions at your respective site.

Upon completion of the research, I will provide a complete summary to each teacher and administrator, if interested. These results would guide my research in determining the importance of the findings.

Please let me know if you would be interested in being a part of this process! Thank you.

**Appendix F**  
**Observation Protocol Form**

## Research Observation Form

Teacher:

Grade:

Teacher Actions	Student Actions (Engagement)
<p>Did the teacher:</p> <ul style="list-style-type: none"> <li>• Follow a structure?</li> <li>• Use a record form?</li> <li>• Provide the student with feedback?</li> <li>• Type of conference?</li> </ul> <p>Additional notes:</p>	

## **Appendix G**

### **Types of Conferences Teacher Handout**



### Types of Guided Math Conferences

Conference Categories	Description	Who is responsible?
Compliment Conference	Used to motivate, lift spirits or discouraged learners	Teacher
Comprehension Conference	Assessing and extending degree of student comprehension of math concepts	Teacher
Skill Conference	Assessing and extending student skills, including both process and computation skills	Teacher
Problem-Solving Conference	Used to explore problem-solving strategies applied by student and then strengthen their strategy toolbox, if needed	Teacher
Self-Assessment and Goal-Setting Conference	Used to review progress toward meeting learning targets and then to create learning goals	Teacher & student
Recheck Conference	Used to see if students are applying what they learned in previous conference	Teacher

### Structure of a Guided Math Conference

Sequential Steps	Teacher Role	Student Role	Lead Role
Step 1: Research Student Understanding & Skill	<ul style="list-style-type: none"> <li>Observes student work</li> <li>Listens carefully to student's description of work</li> <li>Searches for evidence of strengths and needs</li> <li>Questions to understand student thinking</li> </ul>	<ul style="list-style-type: none"> <li>Shows mathematical work</li> <li>Explains mathematical thinking</li> <li>Considers and describes possible alternate strategies</li> <li>Makes mathematical connections</li> <li>Shares any confusion or questions about the math</li> </ul>	Student
Step 2: Decide What is Needed	<ul style="list-style-type: none"> <li>Decide what the student has done well; compliment</li> <li>Decide on a teaching point</li> <li>Decide how to teach teaching point</li> </ul>	<ul style="list-style-type: none"> <li>Accept and reflect on compliment from teacher</li> <li>Remain mathematically focused</li> <li>Prepare to attend to the teaching point</li> </ul>	Teacher
Step 3: Teach to Student Needs	<ul style="list-style-type: none"> <li>Teach teaching point</li> <li>Monitor and assess student understanding of teaching point</li> <li>Provide scaffolding, if needed, to ensure student proficiency</li> </ul>	<ul style="list-style-type: none"> <li>Practice what is being taught</li> <li>Explain the teaching point in own words</li> <li>Monitor own understanding and share any lack of understanding with teacher</li> </ul>	Shared role
Step 4: Link to the Future	<ul style="list-style-type: none"> <li>Summarize the teaching point</li> <li>Express an expectation to remember and use in the future to the student</li> </ul>	<ul style="list-style-type: none"> <li>Share reflection on what was learned</li> </ul>	Shared role

**Appendix H**  
**Conference Log**

Student	Date	Research	Feedback	Teaching Point



**Appendix I**  
**Predetermined Code List**

### Predetermined Codes/Word List

1. What is the perceived effect of teacher-student conferencing on student engagement?
2. What is the perceived effect of teacher-student conferencing with student achievement?

Engagement	Achievement
<p><b>Engagement:</b></p> <p>Off task/on task</p> <p>Behaviors: attention, focus, involvement, attempts, effort, exertion, action initiation</p> <p>Emotions: Enthusiasm, interest, enjoyment, satisfaction, pride, vitality, zest</p> <p><b>Lack of Engagement:</b></p> <p>Behaviors: passivity, giving up, withdrawal, unfocused, inattentive, distracted, unprepared, absent, half-hearted</p> <p>Emotions: boredom, disinterest, frustration/anger, sadness, worry/anxiety, shame, self-blame</p>	<p>Proficient/Not proficient</p> <p>Comprehensive understanding</p> <p>Thorough understanding</p> <p>Sufficient understanding</p> <p>Inconsistent understanding</p> <p>Above/Below</p> <p>On-grade-level</p> <p>Not on-grade-level</p> <p>Goals</p> <p>Objectives/Learning Targets</p> <p>Growth</p> <p>Accomplished</p> <p>Met/Not Met</p>

## **Appendix J**

### **Interview Protocol Questions**

Interview Protocol:

- Welcome teacher participant
- Introduce facilitator and note-taker
- Review norms:
  - one person speaks at a time
  - there is no wrong answer
  - value confidentiality
  - everyone will have a chance to speak
- Explanation of focus interview
- Explanation of how results from discussion would be used; all participant identities will remain anonymous
- Thank teacher participant

Questions:

1. Will you explain the highlights of teach-student conferencing?
2. What impacts did you see on student engagement because of teacher-student conferencing?
3. What impacts did you see on student achievement because of teacher-student conferencing?
4. Were there other aspects of student learning that were influenced?
5. What are some aspects of conferencing that you did not find helpful?
6. What recommendations would you give to other mathematics teachers about conferencing?
7. Is there anything else you would like to add to the discussion that was not mentioned?