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Using Student Goal Setting and Individual Student Conferences to Increase Academic Achievement in Mathematics

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Using Student Goal Setting and Individual Student Conferences to Increase Academic Achievement in Mathematics

A Quantitative Research Methods Proposal

A Project Presented to the Graduate Faculty of Minnesota State University Moorhead

By

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ABSTRACT

This study focuses on an elementary school in the Midwest region of the United States; this community serves as a regional center of education, commerce, and health care. Participants in this study are a classroom of 17 fifth grade students; 35% girls and 65% boys. The school district in this study recently adopted a new mathematics curriculum, *Bridges*. In using this new mathematics curriculum, the teachers have noticed that many of the fifth-grade students are consistently scoring in the red on the assessments. This research study will investigate whether implementing goal setting and individual student conference sessions will improve fifth grade students' academic achievement, specifically related to mathematics. The following research questions will be used: Does using Student Goal Setting and Individual Student Conferences Increase Academic Achievement in Mathematics? What happens to students' self-evaluation skills when they are required to evaluate their own work? This research will investigate whether implementing goal setting and individual student conference sessions will improve fifth grade students' academic achievement, specifically related to mathematics.

With the *Bridges* math curriculum, students are given a pre-assessment for a unit followed by a post-assessment. After each of these assessments the students complete a self-reflection sheet based on their scores and feelings on the assessment. The unit pre and post assessments will measure student growth through the unit and the assignments will show how the formative assessment process is helping them with the mastery of skills. Data will be compared after each assessment to see if improvements have been made since implementing the goals and conference interventions. The research design selected was a mixed method of quantitative and qualitative action research. The quantitative approach uses the rubric in the *Bridges* math curriculum, while the self-reflection sheets can be analyzed using a qualitative grounded theory approach. A mixed-methods approach was chosen because the researcher wanted to measure growth, but also understand how students felt about the use of setting and reaching goals, feedback on formative assessment, and the opportunity to learn from their mistakes.

Data will be collected via individual, small group, and whole group observations; student conference (discussion); scores from formal and informal assessments, and work samples. Five minutes will be set aside each day to allow students to complete and/or reflect on their mathematics goals. Each student will meet with the teacher at least once a unit (lower students more frequently) for an individual student conference related to their mathematics goals and academic progress. Each unit lasts approximately twenty class periods. With the *Bridges* math curriculum, students are given a pre-assessment for each unit followed by a post-assessment. After each of these assessments the students will complete a self-reflection sheet based on their scores and feelings on the assessment. After gathering the data from the methods above, the pre-assessment score and post- assessment score will be calculated and compared to summarize growth in learning from the beginning to the end of the unit.

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CHAPTER 1. GOAL SETTING AND CONFERENCES FOR ACADEMIC ACHIEVEMENT

As an elementary mathematics teacher, one of the daily struggles is determining what to do next, and where to go, when students are not fully grasping or understanding what is being taught. Are students to move to the next lesson after these incomplete assessments? What should teachers do when students do not understand mathematical concepts being taught? According to both Boaler and Sengupta-Irving (2016), and Gjicali and Lipnevich (2021), many students leave school mathematically underprepared, with negative views on mathematics and their own abilities in terms of mathematics. “Goal setting is utilized by adults regularly to foster success. It has also been shown to benefit academic achievement” (Sides & Cuevas, 2020, p. 1). Goals are beneficial, as they provide for the needed attention and effort required to achieve success, foster great effort, positively impact persistence, and motivate students to learn new strategies and skills. Goal setting provides students with a focus for desired academic outcomes and a direction for achieving academic success. With regards to goal setting theory in the academic setting, research suggests that it may be beneficial for teachers to include goal setting in their day-to-day instructional practices. Wafubwa and Ochieng (2021) pointed out that there is a need for teachers to make use of strategies such as assessment criteria, feedback, learning intentions, and peer assessment in their classrooms. “In an interactive learning environment, feedback should activate students who have to do something with it, elaborate it, and discuss it to link it to prior knowledge” (Barana et al., 2021, p. 4).

Brief Literature Review

Sides and Cuevas (2020) wrote about goals being beneficial, as they provide for the needed attention and effort required to achieve success, foster great effort, positively impact persistence, and motivate students to learn new strategies and skills. Goal setting provides students with a focus for desired academic outcomes and a direction for achieving academic success. When students set and achieve their own goals, they are more likely to attain a sense of self-efficacy and become more academically engaged (Smithson, 2012).

Statement of the Problem

The school district in this study recently adopted a new mathematics curriculum, *Bridges*. In using this new mathematics curriculum, the teachers have noticed that many of the fifth-grade students are consistently scoring in the red on the assessments. This research study investigated whether implementing goal setting and individual student conference sessions would improve fifth grade students' academic achievement, specifically related to mathematics.

Purpose of the Study

This research investigated whether implementing goal setting and individual student conference sessions would improve fifth grade students' academic achievement, specifically related to mathematics. The research was completed with all the students in one fifth-grade classroom. Five minutes was set aside each day to allow students to complete and/or reflect on their mathematics goals. Each student met with the teacher at least once a unit (lower students met more frequently) for an individual student conference related to their mathematics goals and academic progress. The teacher then assessed the growth of academic achievement using a mixed approach of looking at students’ math assessments and grades; formative testing data from fall, winter, and spring; and analyzing their goals. Data was compared after each assessment to

see if improvements had been made since implementing the goals and conference interventions. With the *Bridges* math curriculum, students were given a pre-assessment for each unit followed by a post-assessment. After each of these assessments the students completed a self-reflection sheet based on their scores and feelings on the assessment. Both the unit pre and post assessments measure student growth through the unit and the assignments show how the formative assessment process is helping them with the mastery of skills.

Research Questions

Does using Student Goal Setting and Individual Student Conferences Increase Academic Achievement in Mathematics? What happens to students' self-evaluation skills when they are required to evaluate their own work?

Definition of Variables. The following are the variables of study:

Formative Assessment. Formative assessment is regarded as essential to the classroom and should be part of the learning process (Wafubwa & Ochieng, 2021). Formative assessment is seen as a tool to encourage students to 'learn how to learn' by emphasizing the process of teaching and learning and engaging students as partners in the learning process. Formative assessments allow students build skills and develop a wide range of efficient learning strategies for lifelong learning and become independent and self-regulating learners.

Student Self-Reflection. Student self-reflection was completed after each unit pre-assessment and post-assessment. "Monitoring practices foster students' self-monitoring while scaffolding activities stimulate students' to reflect on their learning process" (Wafubwa & Ochieng, 2021, p. 124).

Feedback. Feedback is information provided to a student from a teacher to inform them on what needs to be improved and how to do so. Barana et al. (2021) breaks feedback into four main levels: task level (*giving information about how well the task has been completed*), process level (*adding details about the main process needed to perform the task*), self-regulation level (*activating metacognitive processes*) and self-level (*adding individual evaluations and affects about the student*). Feedback must be processed to be utilized. In Mathematics, elaborate feedback is often a worked example; a proposal of a solution to the task or of a similar one (Barana et al., 2021).

Student conferences. (part of the feedback process)

Goal Setting. Goal setting has been shown to benefit academic achievement (Sides & Cuevas, 2020). Goals are beneficial, as they provide for the needed attention and effort required to achieve success, foster great effort, positively impact persistence, and motivate students to learn new strategies and skills. Goal setting provides students with a focus for desired academic outcomes and a direction for achieving academic success.

Significance of the Study

The school district in this study recently adopted a new math curriculum, *Bridges*. In using this new mathematics curriculum, the school has noticed that many of the fifth-grade students are consistently scoring in the red on the assessments. This research study investigated whether implementing goal setting and individual student conference sessions would improve fifth grade students' academic achievement, specifically related to mathematics. With the *Bridges* math curriculum, students were given a pre-assessment for a unit followed by a post-assessment. After each of these assessments the students completed a self-reflection sheet based on their scores and feelings on the assessment. The unit pre and post assessments measure student growth

through the unit and the assignments show how the formative assessment process is helping them with the mastery of skills. Data was compared after each assessment to see if improvements had been made since implementing the goals and conference interventions. This research investigated whether implementing goal setting and individual student conference sessions will improve fifth grade students' academic achievement, specifically related to mathematics.

Research Ethics

Permission and IRB Approval. To conduct this study, the researcher will seek MSUM's Institutional Review Board (IRB) approval to ensure the ethical conduct of research involving human subjects (Mills & Gay, 2019). Likewise, authorization to conduct this study will be sought from the school district where the research project will be taken place (See Appendix X and X).

Informed Consent. Protection of human subjects participating in research will be assured. Participant minors will be informed of the purpose of the study via the Method of Assent (See Appendix X) that the researcher will read to participants before the beginning of the study. Participants will be aware that this study is conducted as part of the researcher's master's degree program and that it will benefit her teaching practice. Informed consent means that the parents of participants have been fully informed of the purpose and procedures of the study for which consent is sought and that parents understand and agree, in writing, to their child participating in the study (Rothstein & Johnson, 2014). Confidentiality will be protected using pseudonyms (e.g., Student 1) without the utilization of any identifying information. The choice to participate or withdraw at any time will be outlined both verbally and in writing.

Limitations.

As with most new endeavors, a learning curve existed. While the researcher met regularly with individual students to discuss implementing their goals and reflect on assessments, inevitably some inconsistencies occurred. Regarding limitations for teachers, time management was difficult when student assessments were not finished in class, and the extra time involved meeting with individual students on a regular basis.

Conclusions

This section briefly reviewed significant literature, stated the research questions and the problem, gave the purpose of the study, and defined variables and limitations. The significance of the study, and research ethics were also listed. A review of relevant literature that supports the study in determining how student goal setting and conferences can improve students' conceptual understanding, and achievement in mathematics will be found in the next chapter.

CHAPTER 2. LITERATURE REVIEW

"Because of the onset of the Common Core, teachers across the US are now required to engage students in mathematical practices but many have little experience of doing so" (Boaler, 2016, p. 175). These 'Mathematical Practices' are now essential to the Common Core State Standards (CCSS) adopted in 45 states across the United States; these math practices are meant to be used with all levels and domains of mathematics content. (Boaler, 2016). This research investigated whether implementing goal setting and individual student conference sessions would improve fifth grade students' academic achievement, specifically related to mathematics. The research was completed with all the students in the researcher's classroom. Five minutes was set aside each day to allow students to complete and/or reflect on their mathematics goals. The teacher met with each student at least once a unit (lower students met more frequently) for an individual student conference related to their mathematics goals. The teacher then assessed the growth of academic achievement using a mixed approach of looking at students' math assessments and grades; formative testing data from fall, winter, and spring; and analyzing their goals. Data was compared after each assessment to see if improvements had been made since implementing the goals and conference interventions. "We knew that teachers are often challenged by classes in which students have very different mathematical backgrounds, enthusiasm, and achievements and we wanted to use the study to provide insights into the methods teachers may use to address such student differences" (Boaler, 2016, p. 174). With the *Bridges* math curriculum, students were given a pre-assessment for a unit followed by a post-assessment. After each of these assessments the students completed a self-reflection sheet based on their scores and feelings on the assessment. The unit pre and post assessments measure

student growth through the unit and the assignments show how the formative assessment process is helping them with the mastery of skills.

Goal Setting

"Goal setting is utilized by adults regularly to foster success. It has also been shown to benefit academic achievement" (Sides & Cuevas, 2020, p. 1). Sides and Cuevas also wrote about goals being beneficial, as they provide for the needed attention and effort required to achieve success, foster great effort, positively impact persistence, and motivate students to learn new strategies and skills. Goal setting provides students with a focus for desired academic outcomes and a direction for achieving academic success. According to Smithson (2012), when students are taught to obtain faraway goals in a process of achieving smaller sub-goals, they can make quicker progress in learning skills or content. These tasks are further segmented into specific steps, combined with teacher feedback to let the students know how they are doing in relation to both the sub-goals and the distant, or end goal. Students also learn the skill of self-regulation and improve their self-efficacy and interest in the task during this time. When students set a goal, work toward it, map it, accomplish it, and reflect on it, they can be motivated to perform better on assessments. These goals become personal and viable to each individual student. Goal setting promotes academic success (Smithson, 2012). The results of studies conducted on interventions for mathematical computation fluency revealed that a group using the goal setting intervention showed quicker progress and higher scores in math computation. "The students who set goals to improve the number of problems answered correctly made the most progress" (Sides & Cuevas, 2020, p. 4). As mentioned by Sides and Cuevas, Elementary students involved in setting goals showed an increase in their mathematical performance of multiplication facts. Those results

support the concept of goal setting theory in the academic setting and suggest that it may be beneficial for teachers to include goal setting in their day-to-day instructional practices.

Academic Achievement

According to Boaler (2016) many textbooks in the United States highlight procedural and low-level conceptual work that makes it difficult for teachers to provide opportunities for students to be innovative, create their own mathematical ideas, or extend already established ideas. Letting students repeat, or redo, assignments is an effective way for them to understand that information from feedback was useful (Barana et al., 2021). According to Dompnier et al (2013), the more students are aware of their goals' efficacy within a system, the more their commitment with these goals should predict their academic success. Smithson (2012) said that by establishing reachable goals and allowing students to measure their progress against a specific target, students gain confidence, and motivation, to learn presented concepts. Subsequently, students can in turn perform better on both short-term and long-term assessments. Research suggests that one can reliably produce academic benefits when goal setting is used effectively in the classroom. Goal setting theory is one of the most prevalent and influential theories when addressing motivation and performance (Sides & Cuevas, 2020). Several strategies have been evaluated to develop more fluent recall of basic math facts, including goal setting and performance feedback. Figarola et al. (2008) recognized that research on goals indicates performance feedback has a greater impact on student achievement when performance data is shown to students visually, in the form of a graph than when the data is simply recorded. "If the information is not or cannot be processed by the learner to produce improvements, it will not affect learning" (Barana et al., 2021, p. 4). When students set and achieve their own goals, they are more likely to attain a sense of self-efficacy and become more academically engaged

(Smithson, 2012). “There has been a discussion in the literature aimed at comparing elaborated feedback and corrective feedback—those that just say if the answer is correct or not. Many studies show that the former is more useful to improve” (Barana et al., 2021, p. 4). Boaler (2016) discusses the three main teaching principles: (1) Engage students as active and capable learners, (2) Teach algebraic content through mathematical practices, and (3) Encourage a collaborative community. “Another central goal of our teaching was to encourage mathematical discussions that would increase student understanding and help students feel like members of a mathematical community” (Boaler, 2016, p. 175).

Mastery Learning

According to Cundiff et al. (2020), mastery learning seeks to shift the focus from the teacher to the students, as well as focus on deep, conceptual understanding and regular feedback. Mastery learning stresses the importance of the use of a variety of instructional approaches to engage students and link concepts to their interests and experiences, much in line with current intervention models. Mastery of content specific material is accomplished through active learning techniques, and other strategies, that emphasize creation, analysis, and application with students receiving feedback as they progress through the material. Scholars have stressed the need for active learning techniques to stimulate deep learning among students. Deep learning is defined as “the process of preparing and empowering students to master essential academic content, think critically and solve complex problems, work collaboratively, communicate effectively, have an academic mindset, and be self-directed in their education” (Cundiff et al., 2020, p. 109). In their study, Cundiff et al. (2020) stated that approximately 37 percent of students in their experimental group felt that learning came more naturally to them in their

mastery course; combined aspects of mastery learning "forced" students to learn the concepts in a more meaningful way when compared to their other courses.

Motivation

Contextualization of tasks in real-world settings promotes a deeper understanding, and can be used to create meaning, as students can relate abstract concepts to real-life or concrete objects. "It also works as a stimulus for motivation, since tasks can be closer to the students' lives and interests" (Barana et al., 2021, p. 10). In mathematics, students say that discussing ideas gives a better understanding and makes the discipline more interesting and engaging (Boaler, 2016). "The relationship between mastery goals and academic achievement depends on students' perceptions of mastery goals' social utility and social desirability" (Dompnier et al., 2013, p. 593). According to Ng (2016), there is no published research that has examined the effects of simultaneous endorsement of mastery and performance-approach goals, in the context of motivating students to learn mathematics, but there are studies that found mastery goals positively related to efforts in mathematics learning, valuing of mathematics and achievement levels in mathematics. "Goals define the "wants" that make people perform and become successful" (Smithson, 2012, p. 59). Smithson also wrote, if educators can determine what will energize and activate their students to learn and master content; teaching can become more self-directed, and the students will learn self-efficacy that can last a lifetime. Our goal, as educators, should be for all our students to become successful and responsible for their work, grades, and overall academic performance. According to Hansen (2021), in goal-oriented teaching, learning goals are explained to the students so that they understand them. It is crucial that the students know the goals, understand them, and can actively contribute to achieving the goals; thus, helping them develop ownership of their individual goals. Sides and Cuevas (2020) stated it is

common for students to struggle with motivation when it comes to academics. Motivation greatly affects student learning and performance in the classroom. Educators continue to be faced with the challenge of motivating students to foster academic. Smithson (2012) wanted to determine if motivation could be fostered through goal setting. Not only did goal setting increase or maintain student performance on all assessments in multiple content areas, but there was also an increase in the amount of student-to-student encouragement shown. The overall findings revealed that goal setting was a strong motivator for students to increase their performance and self-efficacy. (Sides & Cuevas, 2020). Boaler (2016) wrote, when teachers emphasize collaboration, students become accountable for their mathematical ideas and methods in partnership with others. According to Wafubwa and Ochieng (2021), students who view assessment as making them responsible learners will increase their learning outcomes, and students' perceptions of assessment positively influence their academic self-efficacy beliefs. Dayal (2021) writes, teacher beliefs about how to teach mathematics affect their teaching of mathematics. Dayal goes on to say that the relationship between beliefs about mathematics, beliefs about teaching mathematics, and the classroom practice of teachers is complex, as well as dynamic, with each belief influencing the others.

Student Conferences

Barana et al. (2021) breaks feedback into four main levels: task level (*giving information about how well the task has been completed*), process level (*adding details about the main process needed to perform the task*), self-regulation level (*activating metacognitive processes*) and self-level (*adding individual evaluations and affects about the student*). Feedback must be processed to be utilized. In Mathematics, elaborate feedback is often a worked example; a proposal of a solution to the task or of a similar one (Barana et al., 2021). "Monitoring practices

foster students' self-monitoring while scaffolding activities stimulate students' to reflect on their learning process" (Wafubwa & Ochieng, 2021, p. 124). "In an interactive learning environment, feedback should activate students who have to do something with it, elaborate it, and discuss it to link it to prior knowledge" (Barana et al., 2021, p. 4).

Formative Assessment

As written by Wafubwa and Ochieng (2021), the growing value connected to the 21st-century skills and competences has made educators and researchers shift the focus of educational assessments from summative to formative. They went on to say that formative assessment is seen as a tool to encourage students to 'learn how to learn' by emphasizing the process of teaching and learning and engaging students as partners in the learning process. Formative assessments allow students build skills and develop a wide range of efficient learning strategies for lifelong learning and become independent and self-regulating learners. Contextualization of tasks in real-world settings promotes a deeper understanding, and can be used to create meaning, as students can relate abstract concepts to real-life or concrete objects. "It also works as a stimulus for motivation, since tasks can be closer to the students' lives and interests" (Barana et al., 2021, p. 10). Feedback is one of many strategies and is most effective for formative assessment. Studies on formative assessment have shown that it has a positive effect on students' achievement and can aid in promoting students' learning. Formative assessment is regarded as essential to the classroom and should be part of the learning process (Wafubwa & Ochieng, 2021). Wafubwa and Ochieng (2021) listed the main features of formative assessment: sharing criteria with learners, developing classroom talk and questioning, giving appropriate feedback, and peer and self-assessment. For teachers to use the information gathered from assessments, and evidence about the students' achievement during teaching, teachers must adapt their educational path to

meet the students' learning needs. Barana et al., (2021) goes on to describe a framework of formative assessment, individuating three different methods of instruction, establishing where students are in their learning; where the students are going; and what needs to be done to get them there. Studies on formative assessment have shown that it has a positive effect on students' achievement and can aid in promoting students' learning. Formative assessment is regarded as essential to the classroom and should be part of the learning process (Wafubwa & Ochieng, 2021). Teachers' conceptions of assessment are significant because different conceptions have the potential to result in different assessment practices (Dayal, 2021). If an educator views assessment as a valuable method of gathering information about teaching and learning, they will use it as an essential part of his or her teaching. Teachers who value the accountability conceptions might use assessment to hold their students accountable for their own learning.

Feedback

Feedback is one of many strategies and is most effective for formative assessment. Barana et al. (2021) defines feedback as 'information provided by an agent (e.g., teacher, peer, book, parent, self, experience) regarding aspects of one's performance or understanding'. Feedback provides "information to learners that would translate into them taking action to understand whatever they could not previously understand. It is different from simply telling the correct answer to the learner" (Dayal, 2021, p. 12). Positive feedback can build a student's self-confidence about their mathematical abilities and understanding and help them understand that mistakes and errors don't need to feel negative. Barana et al. (2021) suggested that feedback can also be withheld for multiple attempts before showing the correct answer, or interactive feedback, to allow students to think more about the task before having a solution given. Barana et al. also found that Interactive Feedback (IF) was more effective for engaging learners in

activities and actions intended to improve their results, and the effects were stronger in low socio-economic contexts. For teachers to use the information gathered from assessments, and evidence about the students' achievement during teaching, teachers must adapt their educational path to meet the students' learning needs. They go on to describe a framework of formative assessment, individuating three different methods of instruction, establishing where students are in their learning; where the students are going; and what needs to be done to get them there. Information provided through feedback should support students in generating self-feedback, which they can use to understand current and desired performance. In other words, external feedback should be transformed into internal feedback, which is a key element of self-regulation, to affect subsequent learning and activate self-regulation. "Feedback acquires effectiveness when it is student-centered, when it actively engages the student in an interactive dialogue, and when it elicits the students' actions to modify their learning trajectories" (Barana et al., 2021, p. 6). Wafubwa and Ochieng (2021) pointed out that there is a need for teachers to make use of strategies such as assessment criteria, feedback, learning intentions, and peer assessment. "Interventions on the teachers' use of monitoring and scaffolding strategies will be necessary so that students can develop more skills to regulate their learning" (Wafubwa & Ochieng, 2021, p. 130). The intent of feedback is to lessen the inconsistency between current and desired understanding, and it can be accomplished both by students and by teachers. Effective feedback must answer three main questions: "Where am I going?" (Indicates what the learning goals are), "How am I going?" (What progress is being made), "Where to next?" (What activities need to be completed to improve progress).

> Feedback can work at four levels: • The task level, giving information about how well the task has been accomplished; • The process level, adding details

> about the main process needed to perform the task; • The self-regulation level, activating metacognitive processes; and • The self-level, adding personal evaluations and affects about the learner (Barana et al., 2021, p. 3).

Interactive Feedback

"There is no doubt that immediate feedback is more useful than delayed feedback" (Barana et al., 2021, p. 9-10). According to Barana et al. (2021), interactive feedback, a relevant formative assessment practice, is particularly relevant in making students process the feedback and use the information gained to improve their understanding. It enables the collection of precise data on the students' level of experience and their progress. When looking at feedback from a structural viewpoint, interactive feedback is part of the question itself, and the step-by-step process is shown immediately before moving on to the next question. Consequently, it should help guarantee that students go through the feedback after determining if their answer was correct. "Interactive feedback can help low-level students because if they are discouraged by a complex task, they are engaged in simpler and more manageable sub-questions and avoid cognitive overload" (Barana et al., 2021, p. 10).

Elaborated Feedback

There has been discussion, and research, aimed at comparing elaborate feedback and corrective feedback—if the answer is correct or not. "Elaborated feedback can refer to explanations of the correct solution, links to further reading materials, cues, suggestions, or their combinations" (Barana et al., 2021, p. 4). When using elaborate feedback, students must read feedback carefully and compare it with their results. "In an interactive learning environment, feedback should activate students who have to do something with it, elaborate it, and discuss it to link it to prior knowledge" (Barana et al., 2021, p. 4). According to Wafubwa and Ochieng

(2021), feedback and success criteria are frequently valued by students and teachers' quality feedback and scaffolding strategy use positively predicts the use of feedback by students. When using elaborated feedback, worked examples are commonly used and several studies show that they are more effective than corrective feedback. Worked examples need to be carefully designed and properly used, so that students do not skip them (Barana et al., 2021).

Theoretical Framework

"In an interactive learning environment, feedback should activate students who have to do something with it, elaborate it, and discuss it to link it to prior knowledge" (Barana et al., 2021p. 4). Barana et al. (2021) goes on to list five key strategies enacted the different processes of instruction: 1. Clarifying and sharing learning intentions and criteria for success; 2. Engineering effective classroom discussions and other learning tasks that elicit evidence of student understanding; 3. Providing feedback that moves learners forward; 4. Activating students as instructional resources; and 5. Activating students as the owners of their own learning. Our school district recently adopted a new mathematics curriculum, *Bridges*. In using this new mathematics curriculum, our school has noticed that many of our fifth-grade students are consistently scoring in the red on the assessments. This research study investigated whether implementing goal setting and individual student conference sessions would improve fifth grade students' academic achievement, specifically related to mathematics.

Research Questions

Does using Student Goal Setting and Individual Student Conferences Increase Academic Achievement in Mathematics? What happens to students' self-evaluation skills when they are required to evaluate their own work?

Conclusions

This chapter reviewed literature that supported my study in determining how student goal setting and conferences can improve students' conceptual understanding, and achievement in mathematics. The next section will look at how students will be creating their academic goals and how the data will be collected, interpreted, and analyzed to determine whether student goal setting and conferences improves students' academic achievement in mathematics.

CHAPTER 3. METHODS

"We knew that teachers are often challenged by classes in which students have very different mathematical backgrounds, enthusiasm, and achievements and we wanted to use the study to provide insights into the methods teachers may use to address such student differences" (Boaler, 2016, p. 174). With the *Bridges* math curriculum, students were given a pre-assessment for a unit followed by a post-assessment. After each of these assessments the students completed a self-reflection sheet based on their scores and feelings on the assessment. The unit pre and post assessments measured student growth through the unit and the assignments showed how the formative assessment process helped them with the mastery of skills.

Research Questions

Does using Student Goal Setting and Individual Student Conferences Increase Academic Achievement in Mathematics? What happens to students' self-evaluation skills when they are required to evaluate their own work?

Research Design

The research design selected was a mixed method of quantitative and qualitative action research. The quantitative approach used the rubric from the *Bridges* math curriculum, while the self-reflection sheets were analyzed using a qualitative grounded theory approach. In this study, a unit pre-assessment and post-assessment was given to students to measure growth in each unit of fifth grade mathematics. Throughout each unit, the researcher gave feedback to students on assignments through student conferences. The assessments and assignments were graded using a rubric provided by the *Bridges* curriculum. The pre-assessments served as formative assessment for students to learn from mistakes and grow in their learning throughout the unit. At the end of

the unit, after completing the unit post-assessment, students were given a self-reflection sheet asking questions about how they felt about the unit and their learning process.

A mixed-methods approach was chosen because the researcher wanted to measure growth, but also understand how students felt about the use of setting and reaching goals, feedback on formative assessment, and the opportunity to learn from their mistakes.

Setting

This study focused on an elementary school in the Midwest region of the United States; this community serves as a regional center of education, commerce, and health care. Railroads played a major role in the development of this town; known as an agricultural community and a football town. 94% of people who live here have more than a high school education. With a current population of roughly 126,748 people: 86% Caucasian, 9% Black or African American, 3% Native American/American Indian, and 4% Asian. An array of industries can be found here, including businesses representing back-office operations, healthcare, education, financial services, manufacturing, and technology.

The school in which the research was conducted has approximately 500 students enrolled, kindergarten through fifth grade, from a variety of ethnic backgrounds, including 4% Asian, 23% African American, 2% Native American, and 66% Caucasian. Participants are ten- and eleven-year-old students in a fifth-grade general education classroom. The sample size for this study was 14. 71% of participants came from a home where parents are married, 12% were divorced or separated, and the remaining were either single, or living with a legal guardian who is a relative, but not their parent. Generally, parents were supportive and involved with their students at the school.

Participants

Participants in this study were a classroom of 14 fifth grade students; 35% girls and 65% boys. Participants were ten- and eleven-year-old students in a fifth-grade general education classroom, 18% were English Language Learners (ELL) or on an Individual Education Plan (IEP), and 45% qualified for Free/Reduced Lunch. 71% of participants came from a home where parents were married, 12% were divorced or separated, and the remaining were either single, or living with a legal guardian who is a relative, but not their parent.

Sampling. This was a purposive sample, a convenience sample. The researcher had easy access to this sample since the participants were students in the researcher's classroom. The results will not represent an entire fifth grade population for this district but will focus on the researcher's own teaching practice.

Instrumentation

Instruments used in this study include the unit pre-assessments, the post- assessments of the units (see Appendix A), and the self-reflection sheets that go along with each assessment (see Appendix B). Checkpoints, work samples, and assignments were also utilized. All these instruments come directly from the *Bridges* mathematics curriculum. Each unit assessment has a rubric provided by the *Bridges* mathematics curriculum that was used to score student work. Other instruments, created by the researcher, include the student version of the unit progress graphing sheet (see Appendix C) and the per student data collection sheet by unit (see Appendix D). The data collection sheets used for each assessment were created by the school district, in conjunction with the information from the assessments and rubrics put out by the *Bridges* curriculum (see Appendix E). The goal sheets used were created by *various authors* and purchased through *Teachers Pay Teachers* (see Appendix F).

Data Collection. Data was collected via individual, small group, and whole group observations; student conference (discussion); scores from formal and informal assessments, and work samples. Data was also collected from checkpoints and work samples throughout each unit.

Data Analysis. After gathering the data from the methods above, the pre-assessment score and post- assessment score were calculated. These scores were then compared to summarize growth in learning from the beginning to the end of the unit. The data from the student conferences and goal setting sheets was used, in conjunction with data from the assignments (formative assessments) to determine if students were showing progress in achieving their goals and increasing their academic achievement. The score for each of the assessments was the data collected for the quantitative study. Students completed a self-reflection and participated in a conference with their teacher (the researcher) based on the data from their assessments; this was the data for the qualitative portion.

Research Questions and System Alignment.

Does using Student Goal Setting and Individual Student Conferences Increase Academic Achievement in Mathematics? What happens to students' self-evaluation skills when they are required to evaluate their own work?

Table 3.1

Research Question(s) Alignment

Research Question	Variables	Instrument	Validity & Reliability	Technique	Source
RQ1	Goal setting, Formative Assessment Feedback, Pre-test and Post-test scores, assignment scores	Goal setting sheet	Both quantitative and qualitative data on the assessments, and information from goal sheets, self-reflections and student	Assessment	The students will be from the co-investigator's 5th grade classroom. All students that are given consent from guardians will participate.
RQ2	Student Conferences, student reflection	student reflection sheet	conferences will be analyzed and compared.	Reflection Sheet	

Procedures

In using the new *Bridges* mathematics curriculum, teachers have noticed that many of the fifth-grade students are consistently scoring in the red on the assessments. This research study investigated whether implementing goal setting and individual student conference sessions would improve fifth grade students' academic achievement, specifically related to mathematics. The research was completed with all 17 students in one fifth-grade classroom. After collecting permission and IRB approval for the study, the researcher shared the study information with participants (parents of students) and obtained informed consent to use the students as part of the research study.

Five minutes was set aside each day to allow students to complete and/or reflect on their mathematics goals. Each student met with the teacher at least once a unit (lower students met

more frequently) for an individual student conference related to their mathematics goals and academic progress. Each unit lasted approximately twenty class periods. With the *Bridges* math curriculum, students were given a pre-assessment for each unit followed by a post-assessment. After each of these assessments the students completed a self-reflection sheet based on their scores and feelings on the assessment.

Both the unit pre and post assessments measured student growth through the unit and the assignments showed how the formative assessment process was helping them with the mastery of skills. The unit pre and post assessments measured student growth through the unit and the assignments showed how the formative assessment process was helping them with the mastery of skills. The teacher then assessed the growth of academic achievement using a mixed approach of looking at students' math assessments and grades; formative testing data from fall, winter, and spring; and analyzing their goals. Data was compared after each assessment to see if improvements were made since implementing the goals and conference interventions. This research investigated whether implementing goal setting and individual student conference sessions would improve fifth grade students' academic achievement, specifically related to mathematics. At the conclusion of the study, findings were written into report form and shared with participants and their parents.

Ethical Considerations

To protect individuals in this action research study, an informed consent form will be sent home with each student and returned with signatures from their parents/guardians. All students who will participate in this study will be kept anonymous by replacing names with Student 1, Student 2, and so on. The results of this data will only be used for the purpose of this study and will be kept safely on the researcher's computer which is password protected. No risk or harm is

intended in this study. All activities conducted are a part of the regular classroom activities that take place daily.

Permission and IRB Approval. To conduct this study, the researcher will seek MSUM's Institutional Review Board (IRB) approval to ensure the ethical conduct of research involving human subjects (Mills & Gay, 2019). Likewise, authorization to conduct this study will be sought from the school district where the research project will be taken place (See Appendix X and X).

Informed Consent. Protection of human subjects participating in research will be assured. Participant minors will be informed of the purpose of the study via the Method of Assent (See Appendix X) that the researcher will read to participants before the beginning of the study. Participants will be aware that this study is conducted as part of the researcher's master's degree Program and that it will benefit her teaching practice. Informed consent means that the parents of participants have been fully informed of the purpose and procedures of the study for which consent is sought and that parents understand and agree, in writing, to their child participating in the study (Rothstein & Johnson, 2014). Confidentiality will be protected using pseudonyms (e.g., Student 1) without the utilization of any identifying information. The choice to participate or withdraw at any time will be outlined both verbally and in writing.

Conclusions

This chapter looked at how the researcher collected and analyzed student mathematical data. The data was collected to see if student conferences and goal setting, paired with frequent formative assessment and feedback encouraged success in a mathematics classroom. The data was collected through a mixed-method action research study. The next chapter focuses on the research study, data collected, and the results and findings of the study.

CHAPTER 4. RESULTS

Introduction, With Summary of Project

In this chapter, the researcher unpacks the findings that resulted from a year-long project. As an elementary mathematics teacher, one of the daily struggles is determining what to do next, and where to go, when students are not fully grasping or understanding what is being taught. Are students to move to the next lesson after these incomplete assessments? What should teachers do when students do not understand mathematical concepts being taught? According to both Boaler and Sengupta-Irving (2016), and Gjicali and Lipnevich (2021), many students leave school mathematically underprepared, with negative views on mathematics and their own abilities in terms of mathematics. “Goal setting is utilized by adults regularly to foster success. It has also been shown to benefit academic achievement” (Sides & Cuevas, 2020, p. 1). Goals are beneficial, as they provide for the needed attention and effort required to achieve success, foster great effort, positively impact persistence, and motivate students to learn new strategies and skills. Goal setting provides students with a focus for desired academic outcomes and a direction for achieving academic success. With regards to goal setting theory in the academic setting, research suggests that it may be beneficial for teachers to include goal setting in their day-to-day instructional practices. Wafubwa and Ochieng (2021) pointed out that there is a need for teachers to make use of strategies such as assessment criteria, feedback, learning intentions, and peer assessment in their classrooms. “In an interactive learning environment, feedback should activate students who have to do something with it, elaborate it, and discuss it to link it to prior knowledge” (Barana et al., 2021, p. 4).

The school district in this study recently adopted a new mathematics curriculum, *Bridges*. In using this new mathematics curriculum, the teachers have noticed that many of the fifth-grade students are consistently scoring in the red on the assessments. This research investigated whether implementing goal setting and individual student conference sessions would improve fifth grade students' academic achievement, specifically related to mathematics. The research was completed with all the students in one fifth-grade classroom. Five minutes was set aside each day to allow students to complete and/or reflect on their mathematics goals. Each student met with the teacher at least once a unit (lower students met more frequently) for an individual student conference related to their mathematics goals and academic progress. The teacher then assessed the growth of academic achievement using a mixed approach of looking at students' math assessments and grades; formative testing data from fall, winter, and spring; and analyzing their goals. Data was compared after each assessment to see if improvements had been made since implementing the goals and conference interventions. With the *Bridges* math curriculum, students were given a pre-assessment for each unit followed by a post-assessment. After each of these assessments the students completed a self-reflection sheet based on their scores and feelings on the assessment. Both the unit pre and post assessments measure student growth through the unit and the assignments show how the formative assessment process is helping them with the mastery of skills.

Data Collection, With Description of Data

Instruments used in this study include the unit pre-assessments, the post- assessments of the units (Appendix A), and the self-reflection sheets that go along with each assessment (Appendix B). Checkpoints, work samples, and assignments were also utilized. All these instruments come directly from the *Bridges* mathematics curriculum. Each unit assessment has a

rubric provided by the *Bridges* mathematics curriculum that was used to score student work. Other instruments, created by the researcher, include the student version of the unit progress graphing sheet (Appendix C) and the per student data collection sheet by unit (Appendix D). The data collection sheets used for each assessment were created by the school district, in conjunction with the information from the assessments and rubrics put out by the *Bridges* curriculum (Appendix E). The goal sheets used were created by *various authors* and purchased through *Teachers Pay Teachers* (Appendix F).

Data was collected via individual, small group, and whole group observations; student conference (discussion); scores from formal and informal assessments, and work samples. Data was also collected from checkpoints and work samples throughout each unit. To compare the strategy, it was necessary to find a way to measure the efficacy for the class. The researcher chose to compare growth in scores from the pretest to the unit post-test (Figure 4.1). A mean of the set of differences was calculated as was the standard deviation for each. The justification for comparing the strategies in this manner was that this measure quantified the growth students made during each strategy and provided a clear picture of how consistently this growth was seen over the population (as shown by the standard deviation).

The subjects showed a mean growth of -1.071 points in Unit 5 unit of the study. Individual scores fell within a standard deviation of 5.663 points of the mean. The highest growth in points observed was observed in students 4 and 7 at 7 points of growth from the pre-test to the post-test. The lowest observed growth was observed in student 3 at -15 points of growth from the pre-test to the post-test (Figure 4.2).

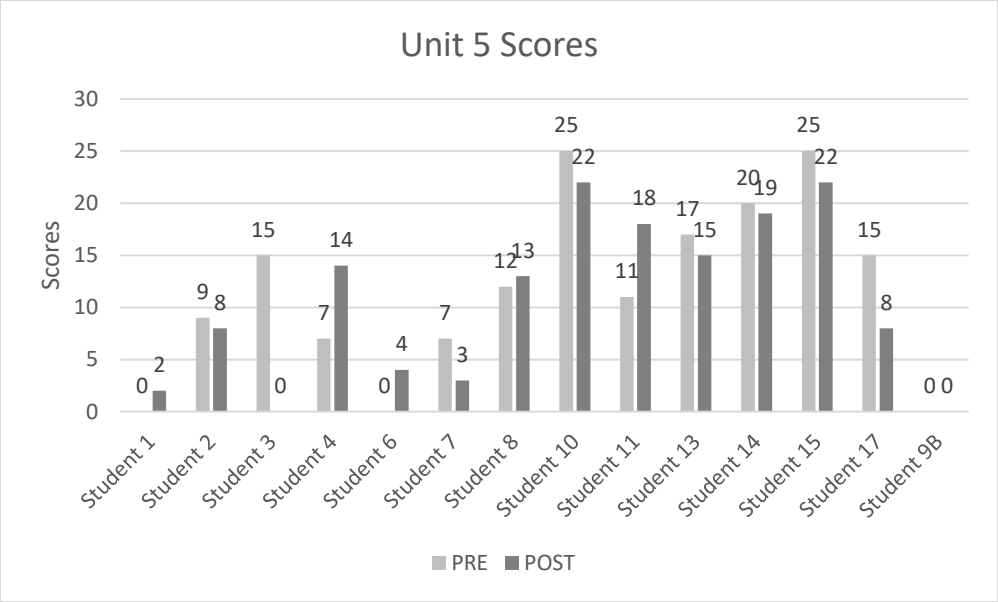

Figure 4.1. Unit 5 Assessments Pre-Test and Final Test Raw Scores

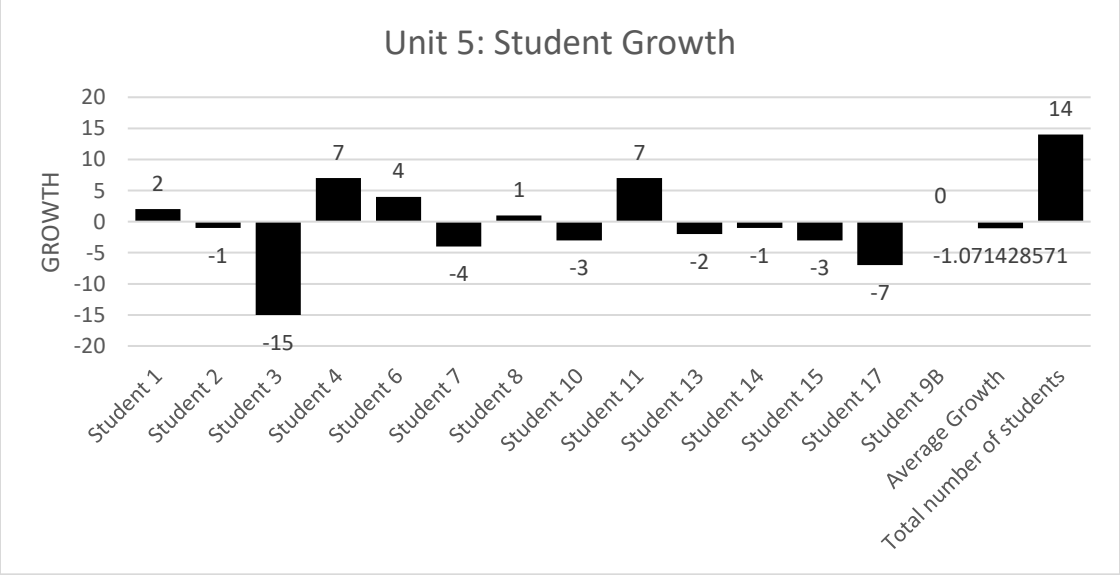

Figure 4.2. Unit 5 Points Growth from Pre-Test to Post-Test

Results

As with most new endeavors, a learning curve existed. While the researcher met regularly with individual students to discuss implementing their goals and reflect on assessments, inevitably some inconsistencies occurred. Regarding limitations for teachers, time management was difficult when student assessments were not finished in class, and the extra time involved meeting with individual students on a regular basis. There were students missing from specific data points: one student from the pre-test and one student from checkpoint 1. On checkpoint 1, there was also a second student who did not attempt the assessment and received a score of 0 from of turning in a blank test. One student received para support on all the assessments, and scores do not accurately reflect the student's own knowledge.

Results from the unit assessments show that 57% of students made negative gains, and 43% of students made growth from pre-test to post-test (Figures 4.3 and 4.4). On the pre-test: students who scored 7–27 pts are working at Tier 1 or Tier 2, while students scoring 0–6 pts may need Tier 3 Support. On checkpoint 1: students who scored 9–11 pts are meeting the standard, students who scored 6–8 pts are approaching the standard, while students who scored 3–5 pts need strategic support and students who scored 0–2 pts need intensive support. On checkpoint 2: students who scored 12-16 pts are meeting the standard, students who scored 8-11 pts are approaching the standard, while students who scored 4-7 pts need strategic support and students who scored 0–3 pts need intensive support. On the post-test: students who scored 14–20 pts are meeting the standard, students who scored 8-11 pts are approaching the standard, while students who scored 7–13 pts need strategic support and students who scored 0–6 pts need intensive support (Table 4.1).

Note. Assessments are abbreviated as follows: Pre-Test (PRE), Checkpoint 1 (CP1), Checkpoint 2 (CP2), and Post-Test (POST).

Students	PRE	CP1	CP2	POST	GROWTH
Student 1	0	0	9	2	2
Student 2	9	4	9	8	-1
Student 3	15	4	9	0	-15
Student 4	7	11	12	14	7
Student 6	0	0	10	4	4
Student 7	7	0	8	3	-4
Student 8	12	7	13	13	1
Student 10	25	8	14	22	-3
Student 11	11	10	13	18	7
Student 13	17	5	8	15	-2
Student 14	20	11	9	19	-1
Student 15	25	11	16	22	-3
Student 17	15	3	9	8	-7
Student 9B			3	0	0
Average Growth					-1.07143
			Total number of students		14

Figure 4.3. Unit 5 Assessments Pre-Test, Checkpoints, and Final Test Scores

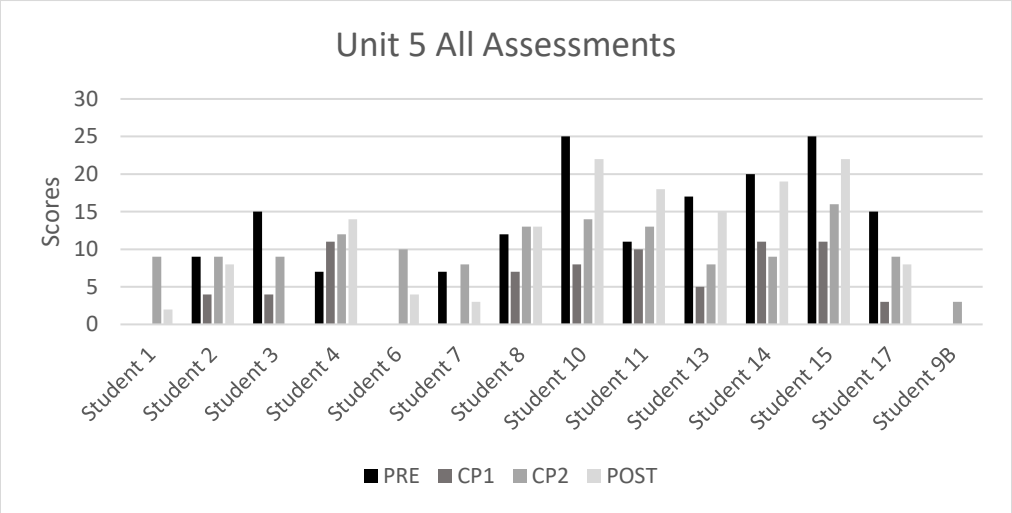

Figure 4.4. Unit 5 All Assessment Scores

Table 4.1

Unit 5 Score / Level of Proficiency

Level of Proficiency	Scores (points)			
	Pre-Test	Checkpoint 1 (CP1)	Checkpoint 2 (CP2)	Post-Test
Meeting Standard	[a]7–27	9–11	12–16	21–27
Approaching Standard		6–8	8–11	14–20
Strategic		3–5	4–7	7–13
Intensive	[b]0–6	0–2	0–3	0–6

Note. This table represents the point range and level of proficiency for each assessment in Unit 5. The pre-test scores follow a different level of proficiency than the two checkpoints and the post-test.

[a] Test scores of 7-27 reflect those of students working at a Tier 1 or a Tier 2. [b] Test scores of 0-6 reflect students who may need or are already receiving Tier 3 Support.

A mean of the set of differences was calculated as was the standard deviation for each. The justification for comparing the strategies in this manner was that this measure quantified the growth students made during each strategy and provided a clear picture of how consistently this growth was seen over the population (as shown by the standard deviation). The subjects showed a mean growth of -1.071 points in Unit 5 unit of the study. The highest growth in points observed was observed in students 4 and 7 at 7 points of growth. The lowest observed growth was observed in student 3 at -15 points of growth (Figures 4.2 and 4.3).

Using Student Goal Setting and Individual Student Conferences to Increase Academic Achievement in Mathematics.

Results from the unit assessments show that 57% of students made negative gains, and 43% of students made growth from pre-test to post-test (Figure 4.3). On the pre-test: students who scored 7–27 pts are working at Tier 1 or Tier 2, while students scoring 0–6 pts may need Tier 3 Support. On checkpoint 1: students who scored 9–11 pts are meeting the standard, students who scored 6–8 pts are approaching the standard, while students who scored 3–5 pts need strategic support and students who scored 0–2 pts need intensive support. On checkpoint 2: students who scored 12-16 pts are meeting the standard, students who scored 8-11 pts are approaching the standard, while students who scored 4-7 pts need strategic support and students who scored 0–3 pts need intensive support. On the post-test: students who scored 14–20 pts are meeting the standard, students who scored 8-11 pts are approaching the standard, while students who scored 7–13 pts need strategic support and students who scored 0–6 pts need intensive support (Table 4.1). The subjects showed a mean growth of -1.071 points in Unit 5 unit of the study. The highest growth in points observed was observed in students 4 and 7 at 7 points of growth. The lowest observed growth was observed in student 3 at -15 points of growth (Figure 4.2).

In this study, a unit pre-assessment and post-assessment (Appendix A) was given to students to measure growth in each unit of fifth grade mathematics. Throughout each unit, the researcher gave feedback to students on assignments through student conferences. The assessments and assignments were graded using a rubric provided by the *Bridges* curriculum. The pre-assessments served as formative assessment for students to learn from mistakes and grow in their learning throughout the unit. At the end of the unit, after completing the unit post-

assessment, students were given a self-reflection sheet (Appendix B) asking questions about how they felt about the unit and their learning process. Students also rated their knowledge of content for each question.

Students' self-evaluation skills when required to evaluate their work.

In this study, a unit pre-assessment and post-assessment (Appendix A) was given to students to measure growth in each unit of fifth grade mathematics. At the end of the unit, after completing the unit post-assessment, students were given a self-reflection sheet (Appendix B) asking questions about how they felt about the unit and their learning process. Students also rated their knowledge of content for each question (Table 4.2). Two students chose to focus on the skills represented in questions 1a, 1b, 1c, and 2. Three students chose to focus on the skills represented in questions 3a and 3b. Five students chose to focus on the skills represented in questions 4a, 4b, 4c, and 5; while seven students chose to focus on the skill represented in question 5. Five students chose to focus on the skills represented in question 6, one student chose to focus on the skills from question 7, and 4 students chose to focus on the skills from question 8. The skills represented in questions 4a, 4b, 4c, and 5 on both the pre-test and post-test were multiplying a fraction by another fraction and solving a related story problem. Question 5 on the post-test also focused on making a labeled sketch to model and solve a problem that involves multiplying one fraction by another fraction (Appendix B).

Table 4.2

Unit 5 Self-Evaluation Ratings for the Pre-Test and Post-Test

Test Questions	1a, 1b, 1c, 2	3a-3b	4a, 4b, 4c, 5	5	6	7	8
Student 1	S	L	L	L	S	L	L
	L	L	W		L	L	S
Student 2	S	L	S	L	L	S	S
	L	W	S		W	S	L
Student 3	S	W	L	L	L	W	W
	L	L	L		L	L	L
Student 4	S	L	L	S	S	S	S
	S	L	W		S	L	S
Student 6	L	L	L	L	L	L	L
	L	L	S		L	L	L
Student 7	S	S	S	L	W	L	L
	L	S	L		L	L	L
Student 8	W	S	L	L	L	S	L
	S	L	S		L	S	L
Student 10	W	W	W	S	S	W	W
	W	S	W		W	W	W
Student 11	S	L	L	S	S	W	W
	W	L	S		W	W	S
Student 13	W	L	W	L	L	S	L
	W	L	W	S	L	L	W
Student 14	W	L	W	L	L	S	S
	W	S	W		W	W	L
Student 15	S	S	L	W	W	S	S
	S	L	S		L	L	S
Student 17	W	S	L	S	S	W	W
	S	S	W		S	W	L
[a] Student 9							
	S	L	S		L	S	S

Note. This table represents the self-evaluation scores of the participants in this study. The highlighted cells represent the skills each student chose to focus on for their goals. I can do this well already (W), I can do this sometimes (S), I need to learn to do this (L).

[a] Student 9 was absent for the Pre-Test and did not complete the self-evaluation.

Data Analysis

After gathering the data from the methods above, the pre-assessment score and post-assessment score were calculated. These scores were then compared to summarize growth in learning from the beginning to the end of the unit. The data from the student conferences and goal setting sheets was used, in conjunction with data from the assignments (formative assessments) to determine if students were showing progress in achieving their goals and increasing their academic achievement. The score for each of the assessments was the data collected for the quantitative study. Students completed a self-reflection and participated in a conference with their teacher (the researcher) based on the data from their assessments; this was the data for the qualitative portion.

Goal Setting

Goal setting has been shown to benefit academic achievement (Sides & Cuevas, 2020). Goals are beneficial, as they provide for the needed attention and effort required to achieve success, foster great effort, positively impact persistence, and motivate students to learn new strategies and skills. Goal setting provides students with a focus for desired academic outcomes and a direction for achieving academic success. When students set and achieve their own goals, they are more likely to attain a sense of self-efficacy and become more academically engaged (Smithson, 2012). The goal setting process and daily self-reflection time helped students to stay focused on the skills they wanted, or needed, to improve on throughout the unit. The instruments utilized were adequate tools for collecting data, however some of the fifth-grade students did not take time to accurately complete the process of setting their goals for the unit. Problems arose, not with the setting of the goal, but with the creation of the action steps to help students reach their goals. Students had a difficult time creating steps to go with their goal, and it was decided

to brainstorm as a class and create a poster of options for students to choose from for their action steps, if they wished.

Academic Achievement, Self-Reflection, and Motivation

According to Dompnier et al (2013), the more students are aware of their goals' efficacy within a system, the more their commitment with these goals should predict their academic success. Smithson (2012) said that by establishing reachable goals and allowing students to measure their progress against a specific target, students gain confidence, and motivation, to learn presented concepts. Subsequently, students can in turn perform better on both short-term and long-term assessments. Research suggests that one can reliably produce academic benefits when goal setting is used effectively in the classroom. Student self-reflection was completed after each unit pre-assessment and post-assessment. "Monitoring practices foster students' self-monitoring while scaffolding activities stimulate students' to reflect on their learning process" (Wafubwa & Ochieng, 2021, p. 124). The instruments utilized were adequate tools for collecting data. This approach was positively received by most of our students but found to not significantly improve student performance. Due to the amount of content and different strategies, the difficulty of the concepts, and the fast pacing of the unit; unit 5 was found to be the most difficult unit in the *Bridges* curriculum.

Student Conferences and Feedback

Feedback is information provided to a student from a teacher to inform them on what needs to be improved and how to do so. Barana et al. (2021) breaks feedback into four main levels: task level (*giving information about how well the task has been completed*), process level (*adding details about the main process needed to perform the task*), self-regulation level (*activating metacognitive processes*) and self-level (*adding individual evaluations and affects*

about the student). Feedback must be processed to be utilized. “In an interactive learning environment, feedback should activate students who have to do something with it, elaborate it, and discuss it to link it to prior knowledge” (Barana et al., 2021, p. 4). The instruments utilized were adequate tools for collecting data. Student conferences were found to be beneficial in helping the students set up their initial goals and action steps, as well as continue to check in on progress towards their goals throughout the unit. Through student conferences, it was discovered that many students did not use the five minutes each day that was set aside for reflection on their goal. Students only used this time to reflect on their goal when they were required to turn in a written reflection to their teacher. In the future, the teacher would require students to turn in, or show their written reflection multiple times a week to ensure students were taking full advantage of the time to reflect on their goals.

Formative Assessment

Formative assessment is regarded as essential to the classroom and should be part of the learning process (Wafubwa & Ochieng, 2021). Formative assessment is seen as a tool to encourage students to ‘learn how to learn’ by emphasizing the process of teaching and learning and engaging students as partners in the learning process. Formative assessments allow students build skills and develop a wide range of efficient learning strategies for lifelong learning and become independent and self-regulating learners. Wafubwa and Ochieng (2021) listed the main features of formative assessment: sharing criteria with learners, developing classroom talk and questioning, giving appropriate feedback, and peer and self-assessment. For teachers to use the information gathered from assessments, and evidence about the students’ achievement during teaching, teachers must adapt their educational path to meet the students’ learning needs.

The instruments utilized were sufficient tools for collecting data for this action research study, but the end results were not the expected results. The approach was positively received by most of the students but found to not significantly improve student performance. Due to the amount of content and different strategies, the difficulty of the concepts, and the fast pacing of the unit; unit 5 was found to be the most difficult unit in the *Bridges* curriculum. The data collected from the assessments supports this unit being the most challenging unit. Through the collection of data, it has been determined that future students will need additional support on this unit. Support for this unit may still include the goal setting and student conferences, as they have been shown to be beneficial for students.

Conclusion

This chapter looked at how the researcher collected and analyzed student mathematical data, and focused on the research study, data collected, and the results and findings of the study. The data was collected, through a mixed-method action research study, to see if student conferences and goal setting, paired with frequent formative assessment and feedback encouraged success in a mathematics classroom. The instruments utilized were sufficient tools for collecting data for this action research study, but the end results were not the expected results. The approach was positively received by most of the students but found to not significantly improve student performance. Due to the amount of content and different strategies, the difficulty of the concepts, and the fast pacing of the unit; unit 5 was found to be the most difficult unit in the *Bridges* curriculum. The data collected from the assessments supports this unit being the most challenging unit. Through the collection of data, it has been determined that future students will need additional support on this unit. Support for this unit may still include the goal setting and student conferences, as they have been shown to be beneficial for students. The final

chapter of this project focuses on a reflection of the project, an action plan for future teaching and a plan for sharing.

CHAPTER 5. IMPLICATIONS FOR PRACTICE

This study was conducted to determine the effects on student achievement, of having students create a goal with action steps, and participate in student conferences about their learning. This study showed that while the approach was positively received by most of the students, it was found to not significantly improve student performance on assessments. More research is needed to determine the effects of having students create a goal with action steps and participate in student conferences about their learning.

Action Plan

Our goal, as educators, should be for all our students to become successful and responsible for their work, grades, and overall academic performance. The instruments utilized were sufficient tools for collecting data for this action research study, but the end results were not the expected results. The approach was positively received by most of the students but found to not significantly improve student performance. Due to the amount of content and different strategies, the difficulty of the concepts, and the fast pacing of the unit; unit 5 was found to be the most difficult unit in the *Bridges* curriculum. The data collected from the assessments supports this unit being the most challenging unit. Through the collection of data, it has been determined that future students will need additional support on this unit. Support for this unit may still include the goal setting and student conferences, as they have been shown to be beneficial for students. The research answered the overall questions: if implementation of goal setting, student conferences, and reflection time increased students' academic achievement in mathematics. Results from the questions used in this study will assist in a collaboration between the researcher and their teaching team, as well as administrative leadership to create processes

that will improve how interventions can help promote academic success, specifically related to mathematics.

As an instructor, the researcher seeks constant improvement in their practice to increase learning and conceptual understanding in a safe and collaborative environment. Self-evaluation is key to understanding what is working and what can be improved. Based on this action research study's results, the first implication for practice is that goal setting and student conferences are a viable method to assist in the education of young people. Upon completion of this action research project, there was a period of reflection for the researcher. Through the project, it was determined that future students will need additional support on this unit. Support for this unit may still include the goal setting and student conferences, as they have been shown to be beneficial for students. The researcher has already begun to look toward the next school year, gathering supporting materials for assisting students with this difficult unit.

Goal setting has been shown to benefit academic achievement (Sides & Cuevas, 2020). Goal setting provides students with a focus for desired academic outcomes and a direction for achieving academic success. When students set and achieve their own goals, they are more likely to attain a sense of self-efficacy and become more academically engaged (Smithson, 2012). The goal setting process and daily self-reflection time helped students to stay focused on the skills they wanted, or needed, to improve on throughout the unit. Setting goals and student conferences will be continued in the future, both in math and other subjects in the classroom.

The impact of this study for students: When students set and achieve their own goals, they are more likely to attain a sense of self-efficacy and become more academically engaged (Smithson, 2012). The goal setting process and daily self-reflection time helped students to stay focused on the skills they wanted, or needed, to improve on throughout the unit. This study

showed students that difficult content will arise throughout their education, and it is important to set goals, with action steps, to reach their educational goals and destinations.

The impact of this study for parents: Students, families and educators all work together to develop, live, and contribute to a shared school vision. This vision includes continued professional development of all educators to ensure students are successful in their learning and educational journeys.

The impact of this study for administrators: Due to the amount of content and different strategies, the difficulty of the concepts, and the fast pacing of the unit; unit 5 was found to be the most difficult unit in the *Bridges* curriculum. The data collected from the assessments supports this unit being the most challenging unit. Through the collection of data, it has been determined that future students will need additional support on this unit. Support for this unit may still include the goal setting and student conferences, as they have been shown to be beneficial for students. The difficulty of this unit should be taken into consideration when creating the mathematics pacing guide for the next school year. Other support should also be in place to help low-achieving students for this challenging unit.

The impact of this study on school climate: A positive school climate is critically related to school success. The effect of a positive school climate contributes to improved academic outcomes among diverse groups of students. Students, families, and educators all work together to develop, live and contribute to a shared school vision. When teachers and students have a positive relationship, students are more apt to perform to the best of their abilities in the classroom.

To continue building up the mathematics program with effective tools that are easy to use, the following action plan needs to be implemented at this school:

- The continued purchase of:
  - Both the *Number Corner* and *Bridges* curriculums and components, including access to all digital materials and resources found on the *Bridges Educator* website.
  - Materials and manipulatives to support student learning of concepts.
- In-service time for:
  - Staff development to learn about the *Number Corner* and *Bridges* curriculums.
  - Collaboration time to discuss best practices for implementing and using the programs.
  - Parent information packets to answer the most frequently asked questions.
  - Student information packets to help them understand what is expected.
  - School-wide agreement on how to implement the program to get the best results.

By instituting these suggestions, along with other teacher suggestions, the students in this school may improve their mathematics abilities through goal setting and student conferences. Due to the findings and limitations, the researcher recommends continued research on the use of goal setting and student conferences to increase academic scores. This study was conducted with a very small sample of students and should not be considered generalizable. As is the nature of action research, in many ways the study was designed and redesigned while the unit was being instructed. Growth was assessed based on the differences between the pre-test score and the final unit test score. For this study to be statistically testable it would need to be replicated with a control established where the strategy was not in use, and a larger data set compiled to compare

performance as averaged over several units. This study should be considered as a preliminary work, in which it is the researcher's belief that a need for additional study is indicated by the findings.

Plan for Sharing

"Knowing that math in upper elementary is more complex and abstract, coupled with noticeable gaps in math competency, educators have to use differentiation skills to meet their learners' needs and achieve goals established by the school or district" (Anderson, 2022, p. 35). After seeing the results of this study, the researcher feels it would be beneficial to share this with other educators, administration, and the community. The researcher will share the results of this study at their next professional learning community meeting, with their grade level team and school strategist. The faculty have shown an interest in the researchers' study and are curious to see the results. The results of this study may make some of the researchers' coworkers reconsider their teaching of this unit in the math curriculum. This research could also potentially help the researcher's school make changes to the district created pacing guide that all teachers currently use. The research project will also be shared digitally with the school's administrative staff including, but not limited to, the Principal and Associate Superintendent.

Personal Reflections

As educators, it is our responsibility to pave the way for success in all our students' future endeavors. My recommendation would be that students have their goal always written out and with them. Seeing their goal is a reminder and keeps them motivated more than not having a visual. One thing I would have done differently is meet as a group on Fridays to talk more about our successes and what we need to work on for the next time. This discussion is important to have and goes along with the growth mindset that our school strives for in each classroom. This

is something that will be changed as I continue to work with my class. Finding a way to be efficient with all students and helping them to set goals and evaluate / reflect on their work throughout the week would be very beneficial for all my students. The student conferences gave students practice at self-evaluation of their work. I would suggest that students have their goals at their desks, somewhere visible, to look at every day and reflect. The initial meeting as a small group, to create goals, was motivating for the students and increased engagement as they heard what their peers choose to work on for their goals.

This has been a fascinating personal journey. As a stranger to the qualitative method, I have learned a great deal about the method and its compatibility with my own knowledge and skill set. Discovering and reviewing literature related to this topic, that formed the basis for this study, was both an exciting and exhausting experience. I often describe myself as an organized and task-oriented person, which were assets to the analysis portion of this project. Describing the data process and outcome was certainly more time-consuming than anticipated. But perseverance paid off and I am proud of the research conducted. I hope that others will benefit from the rich wealth of information my students, and this study provided me through the course of this action research project.

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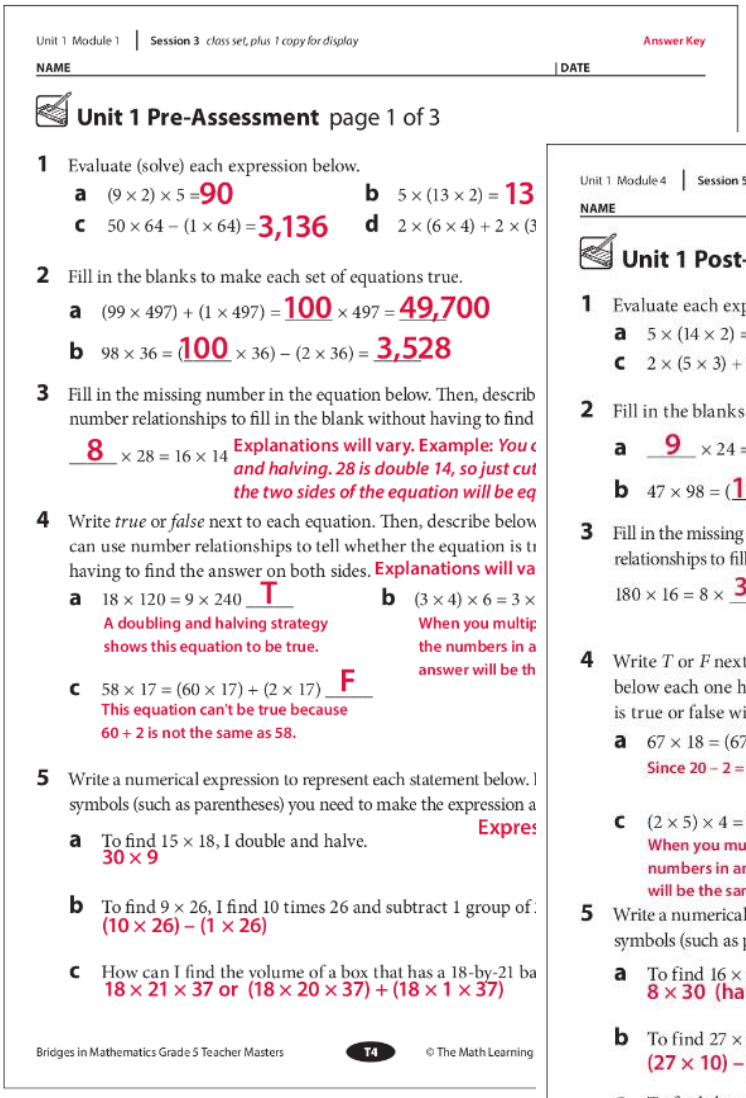
Appendix A: Unit Pre-assessments and Post-assessments of the Units



Unit 1 Module 1 | **Session 3** *class set, plus 1 copy for display* Answer Key

NAME | DATE

Unit 1 Pre-Assessment page 1 of 3

1 Evaluate (solve) each expression below.

a $(9 \times 2) \times 5 =$ **90**

b $5 \times (13 \times 2) =$ **13**

c $50 \times 64 - (1 \times 64) =$ **3,136**

d $2 \times (6 \times 4) + 2 \times (3$

2 Fill in the blanks to make each set of equations true.

a $(99 \times 497) + (1 \times 497) =$ **100** $\times 497 =$ **49,700**

b $98 \times 36 = ($**100**$ \times 36) - (2 \times 36) =$ **3,528**

3 Fill in the missing number in the equation below. Then, describ number relationships to fill in the blank without having to find

8 $\times 28 = 16 \times 14$ **Explanations will vary. Example:** ***You c and halving. 28 is double 14, so just cut the two sides of the equation will be eq***

4 Write *true* or *false* next to each equation. Then, describe below can use number relationships to tell whether the equation is t having to find the answer on both sides. **Explanations will va**

a $18 \times 120 = 9 \times 240$ **T**
A doubling and halving strategy shows this equation to be true.

b $(3 \times 4) \times 6 = 3 \times$
When you multip the numbers in a answer will be th

c $58 \times 17 = (60 \times 17) + (2 \times 17)$ **F**
This equation can't be true because 60 + 2 is not the same as 58.

5 Write a numerical expression to represent each statement below. symbols (such as parentheses) you need to make the expression a

Expres

a To find 15 × 18, I double and halve.
30 × 9

b To find 9 × 26, I find 10 times 26 and subtract 1 group of
(10 × 26) – (1 × 26)

c How can I find the volume of a box that has a 18-by-21 ba
18 × 21 × 37 or (18 × 20 × 37) + (18 × 1 × 37)

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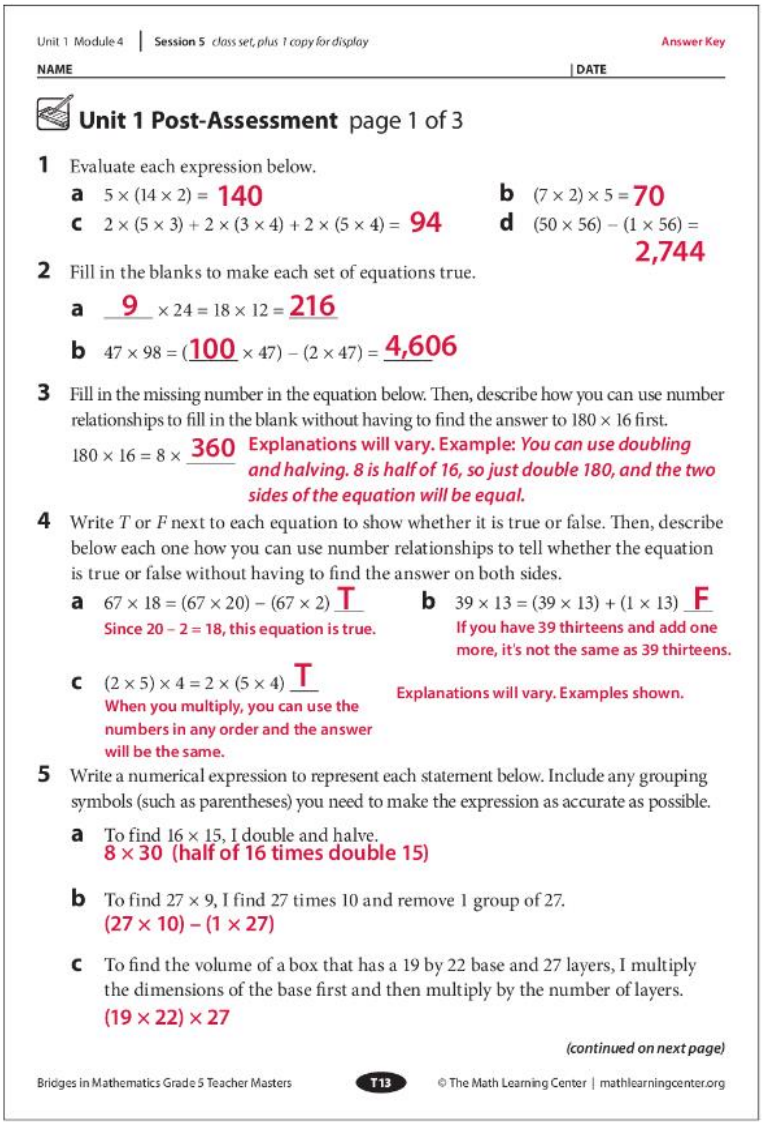

Unit 1 Module 4 | **Session 5** *class set, plus 1 copy for display* Answer Key

NAME | DATE

Unit 1 Post-Assessment page 1 of 3

1 Evaluate each expression below.

a $5 \times (14 \times 2) =$ **140**

b $(7 \times 2) \times 5 =$ **70**

c $2 \times (5 \times 3) + 2 \times (3 \times 4) + 2 \times (5 \times 4) =$ **94**

d $(50 \times 56) - (1 \times 56) =$ **2,744**

2 Fill in the blanks to make each set of equations true.

a **9** $\times 24 = 18 \times 12 =$ **216**

b $47 \times 98 = ($**100**$ \times 47) - (2 \times 47) =$ **4,606**

3 Fill in the missing number in the equation below. Then, describe how you can use number relationships to fill in the blank without having to find the answer to 180 × 16 first.

$180 \times 16 = 8 \times$ **360** **Explanations will vary. Example:** ***You can use doubling and halving. 8 is half of 16, so just double 180, and the two sides of the equation will be equal.***

4 Write *T* or *F* next to each equation to show whether it is true or false. Then, describe below each one how you can use number relationships to tell whether the equation is true or false without having to find the answer on both sides.

a $67 \times 18 = (67 \times 20) - (67 \times 2)$ **T**
Since 20 – 2 = 18, this equation is true.

b $39 \times 13 = (39 \times 13) + (1 \times 13)$ **F**
If you have 39 thirteens and add one more, it's not the same as 39 thirteens.

c $(2 \times 5) \times 4 = 2 \times (5 \times 4)$ **T**
When you multiply, you can use the numbers in any order and the answer will be the same.

Explanations will vary. Examples shown.

5 Write a numerical expression to represent each statement below. Include any grouping symbols (such as parentheses) you need to make the expression as accurate as possible.

a To find 16 × 15, I double and halve.
8 × 30 (half of 16 times double 15)

b To find 27 × 9, I find 27 times 10 and remove 1 group of 27.
(27 × 10) – (1 × 27)

c To find the volume of a box that has a 19 by 22 base and 27 layers, I multiply the dimensions of the base first and then multiply by the number of layers.
(19 × 22) × 27

(continued on next page)

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Appendix B: Self-Reflection Sheets

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NAME | DATE

Unit 5 Pre-Assessment Student Reflection Sheet

Skill	Look at these problems.	I can do this well already.	I can do this sometimes.	I need to learn to do this.	Notes
Can you multiply a whole number by a fraction, and solve related story problems?	1a, 1b, 1c, 2				
Can you tell what will happen when you multiply any number by a fraction less than 1, and explain why it works that way?	3a, 3b				
Can you multiply a fraction by another fraction, and solve related story problems?	4a, 4b, 4c, 5				
Can you make a labeled sketch to model and solve a problem that involves multiplying one fraction by another fraction?	5				
Do you understand what it means to do this division problem: 6 ÷ ½?	6				
Can you use a labeled sketch and numbers to solve a story problem in which you have to divide a fraction by a whole number?	7				
Can you use a labeled sketch and numbers to solve a story problem in which you have to divide a whole number by a fraction?	8				

- After you have made a mark and some notes about each skill above, draw a star next to the two skills that you need to work on the most during this unit.
- Write other ideas about what you want or need to learn how to do during this unit.

Bridges Unit Assessments | Unit 5 *class set*

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NAME | DATE

Unit 5 Post-Assessment Student Reflection Sheet

Skill	Look at these problems.	I can do this well already.	I can do this sometimes.	I need to learn to do this.	Notes
Can you multiply a whole number by a fraction, and solve related story problems?	1a, 1b, 1c, 2				
Can you tell what will happen when you multiply any number by a fraction greater than 1, and explain why it works that way?	3a, 3b				
Can you multiply a fraction by another fraction, and solve related story problems?	4a, 4b, 4c, 5				
Do you understand what it means to do this division problem: 8 ÷ ½?	6				
Can you use a labeled sketch and numbers to solve a story problem in which you have to divide a fraction by a whole number?	7				
Can you use a labeled sketch and numbers to solve a story problem in which you have to divide a whole number by a fraction?	8				

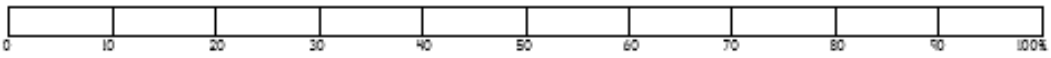
Overall, have you learned the big ideas and skills in this unit?	Yes	Not Quite	No
If yes, what are 1–2 things you learned or improved? If not quite or no, what areas do you still need to work on?			
How many missing assignments did you have during this unit?	None	A Few	A Lot
How many days were you absent during this unit?	None	1–2	3 or more

Bridges Unit Assessments | Unit 5 *class set, optional*

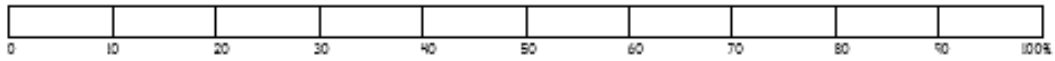
Appendix C: Student Version of the Unit Progress Graphing Sheet

Student #: _____ Unit Progress Graphing *Bridges* Grade 5, 2022-2023

Unit 1 Expressions, Equations & Volume. Pre~Assessment ___ / 35 ___% Post~Assessment ___ / 35 ___%

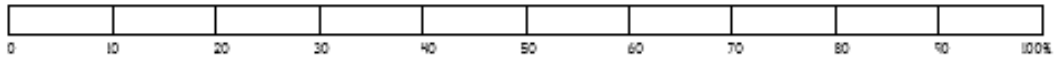


Unit 2 Adding & Subtracting Fractions. Pre~Assessment ___ / 37 ___% Post~Assessment ___ / 37 ___%

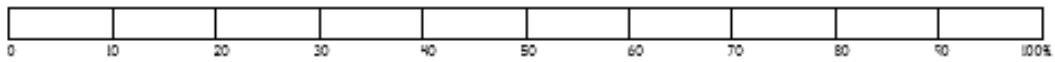


Unit 3 Place Value & Decimals.. Pre~Assessment ___ / 38 ___% Post~Assessment ___ / 38 ___%

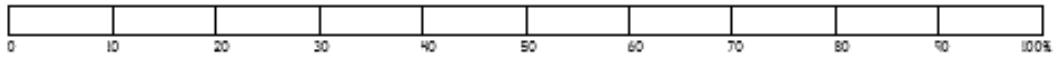
Unit 4 Multiplying & Dividing Whole Numbers & Decimals. Pre~Assessment ___ / 22 ___% Post~Assessment ___ / 22 ___%



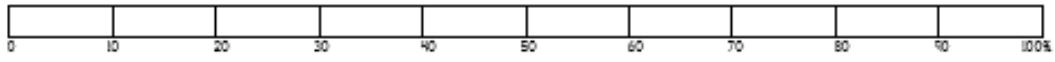
Unit 5 Multiplying & Dividing Fractions. Pre~Assessment ___ / 27 ___% Post~Assessment ___ / 27 ___%



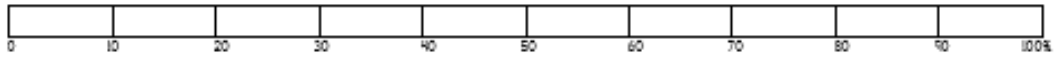
Unit 6 Graphing, Geometry & Volume. Pre~Assessment ___ / 40 ___% Post~Assessment ___ / 40 ___%



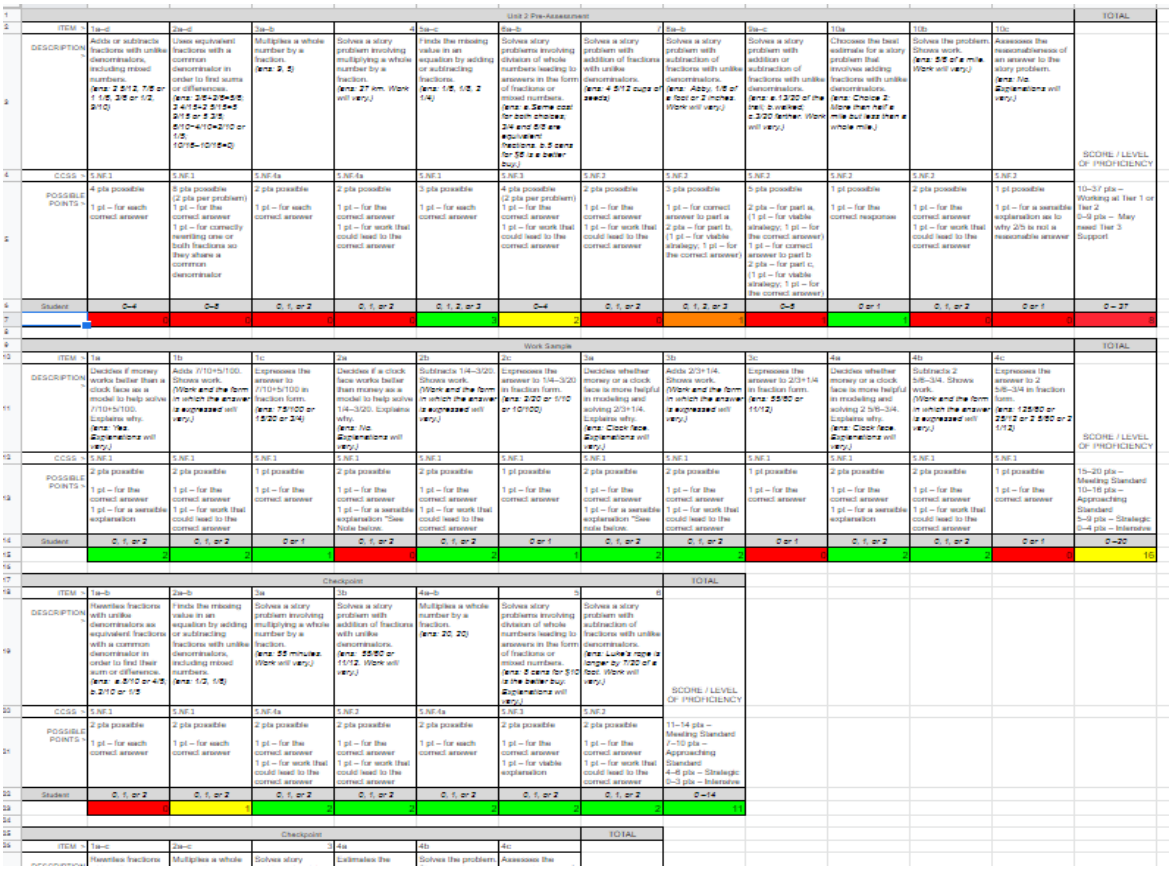
Unit 7 Division & Decimals. Pre~Assessment ___ / 38 ___% Post~Assessment ___ / 38 ___%



Unit 8 Solar Design. Pre~Assessment ___ / ___% Post~Assessment ___ / ___%



Appendix D: Per Student Data Collection Sheet by Unit



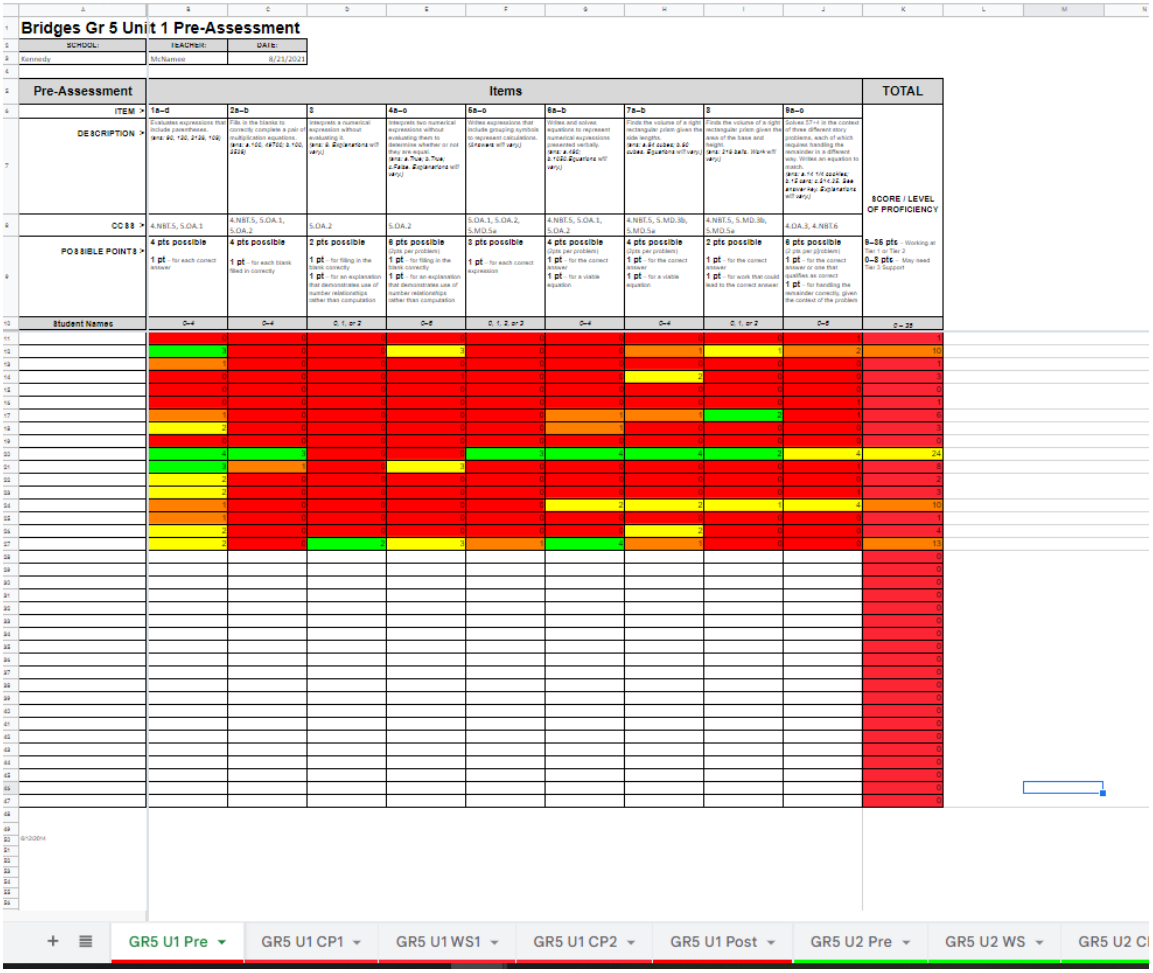
	Unit 2 Pre-Assessment													TOTAL
ITEM >	1a–d	2a–d	3a–b	4	5a–c	6a–b	7	8a–b	8a–c	10a	10b	10c		
DESCRIPTION >	Adds or subtracts fractions with unlike denominators, including mixed numbers. *(ans: 2 5/12, 7/8 or 1 1/8, 3/8 or 1/2, 2 1/10)*	Uses equivalent fractions with a common denominator in order to find sums or differences. *(ans: 2/6+2/6=4/6; 2 4/15+2 5/15=5 2/15 or 5 2/3; 5/10−4/10=2/10 or 1/5; 10/16−10/16=0)*	Multiplies a whole number by a fraction. *(ans: 9, 5)*	Solves a story problem involving multiplying a whole number by a fraction. *(ans: 27 km. Work will vary.)*	Finds the missing value in an equation by adding or subtracting fractions. *(ans: 1/8, 1/3, 2 1/4)*	Solves story problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers. *(ans: a. Same cost for both choices. 2/4 and 5/8 are equivalent fractions. b. 5 cans for 5$ is a better buy.)*	Solves a story problem with addition of fractions with unlike denominators. *(ans: 4 5/12 cups of seeds)*	Solves a story problem with subtraction of fractions with unlike denominators. *(ans: Abby, 1/6 of a foot or 2 inches. Work will vary.)*	Solves a story problem with addition or subtraction of fractions with unlike denominators. *(ans: a. 1 3/20 of the trail; b. walked; c. 3/20 farther. Work will vary.)*	Chooses the best estimate for a story problem that involves adding fractions with unlike denominators. *(ans: Choice 2: More than half a mile but less than a whole mile.)*	Solves the problem. Shows work. *(ans: 5/8 of a mile. Work will vary.)*	Assesses the reasonableness of an answer to the story problem. *(ans: No. Explanations will vary.)*	SCORE / LEVEL OF PROFICIENCY
CCSS >	5.NF.1	5.NF.1	5.NF.4a	5.NF.4a	5.NF.1	5.NF.3	5.NF.3	5.NF.3	5.NF.3	5.NF.3	5.NF.3	5.NF.3	5.NF.3	
POSSIBLE POINTS >	4 pts possible 1 pt – for each correct answer	8 pts possible (2 pts per problem) 1 pt – for the correct answer 1 pt – for correctly rewriting one or both fractions so they share a common denominator	2 pts possible 1 pt – for each correct answer	2 pts possible 1 pt – for the correct answer 1 pt – for work that could lead to the correct answer	3 pts possible 1 pt – for each correct answer	4 pts possible (2 pts per problem) 1 pt – for the correct answer 1 pt – for work that could lead to the correct answer	2 pts possible 1 pt – for the correct answer 1 pt – for work that could lead to the correct answer	3 pts possible 1 pt – for correct answer to part a 2 pts – for part b, (1 pt – for viable strategy; 1 pt – for the correct answer)	5 pts possible 2 pts – for part a, (1 pt – for viable strategy; 1 pt – for the correct answer) 1 pt – for correct answer to part b 2 pts – for part c, (1 pt – for viable strategy; 1 pt – for the correct answer)	1 pt possible 1 pt – for the correct response	2 pts possible 1 pt – for the correct answer 1 pt – for work that could lead to the correct answer	1 pt possible 1 pt – for a sensible explanation as to why 2/5 is not a reasonable answer	10–37 pts – Working at Tier 1 or Tier 2 0–9 pts – May need Tier 3 Support
Student	0–4	0–8	0, 1, or 2	0, 1, or 2	0, 1, 2, or 3	0–4	0, 1, or 2	0, 1, 2, or 3	0–5	0 or 1	0, 1, or 2	0 or 1	0 – 37	
	4	0	2	0	0	3	2	3	4	1	0	0	8	

	Work Sample												TOTAL
ITEM >	1a	1b	1c	2a	2b	2c	3a	3b	3c	4a	4b	4c	
DESCRIPTION >	Decides if money works better than a clock face as a model to help solve 7/10+5/100. Explains why. *(ans: Yes. Explanations will vary.)*	Adds 7/10+5/100. Shows work. *(Work and the form in which the answer is expressed will vary.)*	Expresses the answer to 7/10+5/100 in fraction form. *(ans: 75/100 or 15/20 or 3/4)*	Decides if a clock face works better than money as a model to help solve 1/4–3/20. Explains why. *(ans: No. Explanations will vary.)*	Subtracts 1/4–3/20. Shows work. *(Work and the form in which the answer is expressed will vary.)*	Expresses the answer to 1/4–3/20 in fraction form. *(ans: 2/20 or 5/10 or 10/100)*	Decides whether money or a clock face is more helpful in modeling and solving 2/3+1/4. Explains why. *(ans: Clock face. Explanations will vary.)*	Adds 2/3+1/4. Shows work. *(Work and the form in which the answer is expressed will vary.)*	Expresses the answer to 2/3+1/4 in fraction form. *(ans: 55/60 or 11/12)*	Decides whether money or a clock face is more helpful in modeling and solving 2 5/8–3/4. Explains why. *(ans: Clock face. Explanations will vary.)*	Subtracts 2 5/8–3/4. Shows work. *(Work and the form in which the answer is expressed will vary.)*	Expresses the answer to 2 5/8–3/4 in fraction form. *(ans: 125/60 or 25/12 or 2 5/60 or 2 1/12)*	SCORE / LEVEL OF PROFICIENCY
CCSS >	5.NF.1	5.NF.1	5.NF.1	5.NF.1	5.NF.1	5.NF.1	5.NF.1	5.NF.1	5.NF.1	5.NF.1	5.NF.1	5.NF.1	
POSSIBLE POINTS >	2 pts possible 1 pt – for the correct answer 1 pt – for a sensible explanation	2 pts possible 1 pt – for the correct answer 1 pt – for work that could lead to the correct answer	1 pt possible 1 pt – for the correct answer	2 pts possible 1 pt – for the correct answer 1 pt – for a sensible explanation "See Note below."	2 pts possible 1 pt – for the correct answer 1 pt – for work that could lead to the correct answer	2 pts possible 1 pt – for the correct answer	2 pts possible 1 pt – for the correct answer 1 pt – for a sensible explanation "See note below."	2 pts possible 1 pt – for the correct answer 1 pt – for work that could lead to the correct answer	1 pt possible 1 pt – for the correct answer	2 pts possible 1 pt – for the correct answer 1 pt – for a sensible explanation	2 pts possible 1 pt – for the correct answer 1 pt – for work that could lead to the correct answer	1 pt possible 1 pt – for the correct answer	15–20 pts – Meeting Standard 10–16 pts – Approaching Standard 5–9 pts – Strategic 0–4 pts – Intensive
Student	0, 1, or 2	0, 1, or 2	0 or 1	0, 1, or 2	0, 1, or 2	0 or 1	0, 1, or 2	0, 1, or 2	0 or 1	0, 1, or 2	0, 1, or 2	0 or 1	0 –20
	2	2	1	0	2	1	2	2	0	2	2	0	16

	Checkpoint							TOTAL
ITEM >	1a–b	2a–b	3a	3b	4a–b	5	6	
DESCRIPTION >	Rewrites fractions with unlike denominators as equivalent fractions with a common denominator in order to find their sum or difference. *(ans: a. 8/10 or 4/5 b. 2/10 or 1/5*	Finds the missing value in an equation by adding or subtracting fractions with unlike denominators, including mixed numbers. *(ans: 1/3, 1/8)*	Solves a story problem involving multiplying a whole number by a fraction. *(ans: 55 minutes. Work will vary.)*	Solves a story problem with addition of fractions with unlike denominators. *(ans: 55/60 or 11/12. Work will vary.)*	Multiplies a whole number by a fraction. *(ans: 20, 20)*	Solves story problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers. *(ans: 5 cans for 5$ is the better buy. Explanations will vary.)*	Solves a story problem with subtraction of fractions with unlike denominators. *(ans: Luke's rope is longer by 7/20 of a foot. Work will vary.)*	SCORE / LEVEL OF PROFICIENCY
CCSS >	5.NF.1	5.NF.1	5.NF.4a	5.NF.3	5.NF.4a	5.NF.3	5.NF.2	
POSSIBLE POINTS >	2 pts possible 1 pt – for each correct answer	2 pts possible 1 pt – for each correct answer	2 pts possible 1 pt – for the correct answer 1 pt – for work that could lead to the correct answer	2 pts possible 1 pt – for the correct answer 1 pt – for work that could lead to the correct answer	2 pts possible 1 pt – for each correct answer	2 pts possible 1 pt – for the correct answer 1 pt – for viable explanation	2 pts possible 1 pt – for the correct answer 1 pt – for work that could lead to the correct answer	11–14 pts – Meeting Standard 7–10 pts – Approaching Standard 4–6 pts – Strategic 0–3 pts – Intensive
Student	0, 1, or 2	0, 1, or 2	0, 1, or 2	0, 1, or 2	0, 1, or 2	0, 1, or 2	0, 1, or 2	0 –14
	0	1	2	2	2	2	2	11

	Checkpoint						TOTAL
ITEM >	1a–c	2a–c	3	4a	4b	4c	
DESCRIPTION >	Rewrites fractions	Multiplies a whole	Solves story	Estimates the	Solves the problem.	Assesses the	

Appendix E: Data Collection Sheets



Bridges Gr 5 Unit 1 Pre-Assessment

SCHOOL:	TEACHER:	DATE:
Kennedy	McNamee	8/23/2021

Pre-Assessment	Items									TOTAL
ITEM >	1a–d	2a–b	3	4a–b	5a–c	6a–b	7a–b	8	9a–c	
DESCRIPTION >	Evaluates expressions that include parentheses (ans: 90, 120, 2128, 108)	Fills in the blanks to correctly complete a pair of multiplication equations. (ans: a 100, 47/100; b 100, 2324)	Interprets a numerical expression without evaluating it. (ans: B. Explanations will vary)	Interprets two numerical expressions without evaluating them to determine whether or not they are equal. (ans: a True; b True; c False. Explanations will vary)	Writes expressions that include grouping symbols to represent calculations. (Answers will vary)	Writes and solves equations to represent numerical expressions presented verbally. (ans: a 492; b 1020. Equations will vary)	Finds the volume of a right rectangular prism given the side lengths. (ans: a 81 cubes; b 60 cubes. Equations will vary)	Finds the volume of a right rectangular prism given the area of the base and height. (ans: 216 balls. Work will vary)	Solves ET=d in the context of three different story problems, each of which requires handling the remainder in a different way. Writes an equation to match. (ans: a 14 full packets, 3 cards; c 214.28. See answer key. Explanations will vary)	SCORE / LEVEL OF PROFICIENCY
CCSS >	4.NBT.5, 5.OA.1	4.NBT.5, 5.OA.1, 5.OA.2	5.OA.2	5.OA.2	5.OA.1, 5.OA.2, 5.MD.5a	4.NBT.5, 5.OA.1, 5.OA.2	4.NBT.5, 5.MD.3b, 5.MD.5a	4.NBT.5, 5.MD.3b, 5.MD.5a	4.OA.3, 4.NBT.6	
POSSIBLE POINTS >	4 pts possible 1 pt – for each correct answer	4 pts possible 1 pt – for each blank filled in correctly	2 pts possible 1 pt – for filling in the blank correctly 1 pt – for an explanation that demonstrates use of number relationships rather than computation	6 pts possible (2pts per problem) 1 pt – for filling in the blank correctly 1 pt – for an explanation that demonstrates use of number relationships rather than computation	3 pts possible 1 pt – for each correct expression	4 pts possible (2pts per problem) 1 pt – for the correct answer 1 pt – for a viable equation	4 pts possible (2pts per problem) 1 pt – for the correct answer 1 pt – for a viable equation	2 pts possible 1 pt – for the correct answer 1 pt – for work that could lead to the correct answer	6 pts possible (2 pts per problem) 1 pt – for the correct answer or one that qualifies as correct 1 pt – for handling the remainder correctly, given the context of the problem	0–26 pts – Working at Tier 1 or Tier 2 0–8 pts – May need Tier 3 Support
Student Names	0–4	0–4	0, 1, or 2	0–6	0, 1, 2, or 3	0–4	0–4	0, 1, or 2	0–6	0 – 25

GR5 U1 Pre | GR5 U1 CP1 | GR5 U1 WS1 | GR5 U1 CP2 | GR5 U1 Post | GR5 U2 Pre | GR5 U2 WS | GR5 U2 C

Appendix F: Goal Sheets