A CASE STUDY OF STUDENT INVOLVED DATA USE WITH A MASTERY ORIENTATION UTILIZING DATA FROM FORMATIVE ASSESSMENTS

A Record of Study

by

GLENDA ANNE THACKER

Submitted to the Office of Graduate and Professional Studies of
Texas A & M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF EDUCATION

Chair of Committee,	Julie Singleton
Co-Chair of Committee,	Sara Raven
Committee Members,	Sharon Matthews
	Sandra Acosta
Head of Department,	Michael De Miranda

August 2019

Major Subject: Curriculum and Instruction

ABSTRACT

This action research study involving secondary math teachers in a major suburban central Texas school district will present information related to student-involved data use (SIDU) in the district and present case study findings from a SIDU intervention with a mastery orientation utilizing formative assessments in five sixth grade math classrooms. The study seeks first to explain current SIDU practice in the district and the reasons why teachers employ such practices. Findings from the SIDU intervention will present information regarding the actions of teachers and students during use of the intervention, followed by teacher feedback and suggestions for modifications to the practice of SIDU in the future. Quantitative data were analyzed using descriptive statistical analysis while qualitative data were analyzed using content analysis methods. The results will inform recommendations for the use of SIDU in district secondary math classrooms for further study and refinement.

DEDICATION

The doctoral journey and this Record of Study was undertaken in memory of my grandfather, William Lafe Fricks, who instilled in me the value of an education at a very young age. He was a great teacher, administrator, and role model and encouraged me to never limit myself in what I could accomplish. I also attribute the ability to get through the writing process to my mom who never told us what words meant or how they were spelled, but instead made us look them up in a dictionary. I first learned about reading and writing from her guidance.

I would also like to recognize my sons, Brett Allen and Aaron Thacker-Woodruff, whose encouragement was more valued than they know. Finally, I would like to dedicate this work to my sweet, patient husband, Troy Thacker, and my daughters, Codi Huff and Andee Mote. Their love, encouragement, and belief in me along the way kept me going.

ACKNOWLEDGEMENTS

I would like to thank my committee co-chairs, Dr. Sara Raven and Dr. Julie Singleton, and my committee members Dr. Sharon Matthews and Dr. Sandra Acosta for their support and encouragement throughout the research process. I want to also recognize Dr. Radhika Viruru for leading our doctoral cohort in our learning journey, and Ambyr Rios, for keeping us on track along the way.

I also would like to thank so many of my friends and colleagues who were thinking partners and encouraged me along this journey, and most especially my math partners Mimi Salmon and Diana Farris. Finally, I would especially like to thank the five teachers who allowed me to involve them directly in this study. I am amazed every day at the commitment of teachers in the classroom who inspire their students to learn. They, in turn, inspire me and are truly the unsung heroes in schools.

TABLE OF CONTENTS

Page

CHAPTER I INTRODUCTION OF CONTEXT AND PURPOSE OF THE ACTION 1

National Context 1
Situational Context 3
The Problem 4
Relevant History of the Problem 5
Significance of the Problem 7
Research Questions 8
Personal Context 8
Researcher's Role and Personal History 8
Journey to the Problem 9
Significant Stakeholders 12
Important Terms 13
Closing Thoughts on Chapter I 14

CHAPTER II REVIEW OF SUPPORTING SCHOLARSHIP 16

Relevant Historical Background 16
Alignment with Action Research Traditions 18
Theoretical and Conceptual Framework 19
Most Significant Research and Practice Studies 20
Student Involved Data Use 20
Formative Assessment 26
Self-Regulated Learning 28
Growth Mindset 30
Achievement Goal Orientations 33
Closing Thoughts on Chapter II 35

CHAPTER III SOLUTION AND METHODS 36

Outline of Proposed Solution 37
Justification of Proposed Solution 41
Study Context and Participants 42
Proposed Research Paradigm 45
Data Collection Methods 45
Data Sources and Analysis 46
Timeline of Study 54
Reliability and Validity Concerns or Equivalents 56
Closing Thoughts on Chapter III 57

CHAPTER IV ANALYSIS AND RESULTS 59

Presentation of Data 60
Research Question 1 60
Research Question 2 68
The Language of the Standards 72
Growth 74
Seeing 76
Ownership of Learning 77
Feedback 78
SIDU Management 78
Research Question 3 80
Results of Research 87
Research Question 1 87
Research Question 2 88
Research Question 3 90
Interaction Between the Research and the Context 92
How Did the Context Impact the Results 93
How Did the Research Impact the Context 93
Summary 94

CHAPTER V SUMMARY AND CONCLUSIONS 96

Discussion of Results in Relation to the Literature 97
Implications for Practice 105
Connections to Context 106
Connections to Field of Study 107
Discussion of Personal Lessons Learned 109
Recommendations 110
Closing Thoughts 110

REFERENCES 112

APPENDIX A 123

APPENDIX B 124

APPENDIX C 125

APPENDIX D 127

APPENDIX E 129

APPENDIX F 131

APPENDIX G 133

APPENDIX H 134

APPENDIX I 138

LIST OF FIGURES

Page

Figure 1.1: Warm-up Tracking Example 4

Figure 3.1: Proposed SIDU Intervention 37

Figure 3.2: Research Design 46

Figure 4.1: Shading and NY on the SIDU Tracking Document 75

LIST OF TABLES

Page

Table 3.1: SIDU Intervention Teacher Profile....44

Table 3.2: SIDU Survey Questions....49

Table 3.3: Survey Question 4 Question and Answer Choices....50

Table 3.4: Timeline of Study....55

Table 4.1: Math Courses Taught of Surveyed Math Teachers....61

Table 4.2: Years of Teaching Experience of Surveyed Teachers....62

Table 4.3: Types of Data Students Track in Classrooms....63

Table 4.4: Ways Teachers Discuss Data with their Students....65

Table 4.5: Reasons Teachers have Students Track their own Data....67

Table 4.6: SIDU Classroom Observations Math Courses, Campus Demographics, and STAAR Performance....69

Table 4.7: Initial Codes, Descriptors, and Excerpts from Observation and Document Data....71

Table 4.8: Identified Codes, Descriptors, and Excerpts from Observations and Documents....72

Table 4.9: Benefits and Limitations of the SIDU Intervention for Students and Teachers....82

Table 4.10: SIDU Intervention Modifications to the Process and Document....84

Table 4.11: Identified Codes, Descriptors, and Excerpts from Teacher Focus Group....85

CHAPTER I

INTRODUCTION OF CONTEXT AND PURPOSE OF THE ACTION

Monitoring and tracking educational data in a context of data-based decision making (DBDM) is not only a common practice in education, but is an expectation for all educators. During the past thirty years, data use has also become more prevalent in educational settings due to the increased emphasis on high-stakes exams and state and federal accountability measures (Hamilton et al., 2009). An extension of the widespread use of data in education is the more recent practice of involving students in their own data, referred to as student-involved data use (SIDU) (Jimerson & Reames, 2015). The reasons for which teachers involve students in their own data varies, as well as the types of data utilized for the practice. To further complicate this issue, little is still known about the best ways to implement SIDU and the effects it has on students (Jimerson & Reames, 2015).

National Context

Policymakers and educational leaders alike support and expect all teachers and educators in today's educational environment to use data to continually seek ways to improve student outcomes (Data Quality Campaign, 2011; U.S. Department of Education, 2011). In the effort to ultimately impact student achievement and performance, the recommendations are for all stakeholders in a student's education to participate in systematically collecting and analyzing data to inform educational decisions for the student. These stakeholders include education policymakers, school and district administrators, teachers, parents, and students alike (Hamilton et al., 2009). As a result, many teachers today are well informed regarding the expectation to use and analyze student data to promote student learning.

In response to the call for analysis and use of data in schools, the Institute of Education Sciences published a practice guide in 2009 to help educators discern ways to effectively utilize educational data (Hamilton et al., 2009). The practice guide outlines five recommendations, which include utilizing a school-wide data system that supports a culture of data use and provides supports for this vision (Hamilton et al., 2009). Additional recommendations include making data part of a continual process of instructional improvement and also suggests including students in the examination of their own data (Hamilton et al., 2009).

Considerable research exists on the use of data by educators in educational settings (Coburn & Turner, 2011; Hamilton et al., 2009; Mandinach & Jackson, 2012; Schildkamp, Lai & Earl, 2013), but little research exists on involving students in their own data (Jimerson, Cho, & Reames, 2016; Jimerson & Reames, 2015; Marsh, Farrell, & Bertrand, 2016); although, this practice is largely supported by educational leaders and policymakers (Hamilton et al., 2009, Marzano, 2007). Adding to this is the problem of involving students in their own data, which has been embraced and implemented by teachers in the classroom prior to the establishment of a strong research base exploring its effects or outlining how it is best implemented and practiced with students (Jimerson & Reames, 2015; Jimerson et al., 2016; Kennedy & Datnow, 2011; et al., 2016). Consequently, a multitude of practices exist for involving students in their own data.

Because the contexts for involving students in their data in beneficial ways have yet to be thoroughly researched, it is critical to further explore the practice. Kennedy and Datnow (2011) posit, "Questioning the reform itself by analyzing its impacts on students and teachers has the potential of shaping the reform in new ways that are more responsive to all stakeholders" (p. 1267). Understanding the contexts and nuances of involving students in their own data needs further exploration to identify practices that benefit both teachers and students.

Situational Context

Numerous sixth, seventh, eighth, and algebra I math teachers in a major suburban central Texas school district integrate the practice of involving students in their own data use in their classrooms. The practice varies from teacher to teacher, grade level to grade level, and school-to-school. Inconsistencies exist in the way teachers implement the practice, the documents they use for students to record, track, and reflect on their data, and the types of data students use for tracking. Further, the reasons for why teachers use SIDU vary (Thacker, 2018).

Although these teachers may have received more formal training on the practice of involving students in their own data in locations outside the district, systematic formal training has not occurred within the district. Generally, teachers collegially share ideas and documents they use in their classrooms for students to use to track their own data. These documents are also shared on behalf of teachers in district professional development sessions. The documents are sometimes teacher created, documents received in professional learning sessions, or documents that teachers have found on online teacher websites.

District secondary math teachers cite various reasons for involving students in tracking and analyzing their own data. The majority of teachers' reasons for involving students in their own data are to encourage students to take ownership of their own learning and identify their own strengths and weaknesses in order to improve their learning. Some teachers identified that they wanted students set goals and be aware of their learning progress (Thacker, 2018).

Students in the district math classrooms generally track two types of data: grades and learning on the Texas Essential Knowledge and Skills. Some teachers have students track both types of data. The way this data is tracked in the classroom also varies. Some teachers have students track their unit test grades on one document and then use this document throughout the

year so that students are able to see their progress from test to test during the school year (Appendix A). Other teachers have students track and analyze their data on a single document after a unit test so that they can analyze how they performed on individual math standards and on the unit test overall (Appendix B). A few teachers have students' track learning on math learning standards on warm-ups while learning is in progress; in these instances, learning is tracked throughout the school year, rather than by unit, and only on the standards identified as readiness standards for the grade level. Students mark a "√" for items they get correct, and an "x" for items that are incorrect. An example of one document is shown in Figure 1.1.

Figure 1.1: Warm-Up Tracking Example

WARM-UP TRACKING

TEKS	I Can:
8.2D	Ordering a set of Real Numbers
8.4B	Graph Proportional Relationships
8.4B	Interpret Unit Rate as the Slope of a Line
8.4C	Use Data from a Table to determine rate of change/slope/y-int
8.4C	Use Data from a Graph to determine rate of change/slope/y-int
8.5G	Identify Functions using Ordered Pairs
8.5G	Identify Functions using Tables
8.5G	Identify Functions using Mapping
8.5G	Identify Functions using Graphs
8.5I	Write an equation y=mx+b from a word problem
8.5I	Write an equation y=mx+b from coordinate points

Note: This example is an excerpt from a Warm-Up Tracking document used in 8th Grade Math on the Texas Essential Knowledge and Skills Readiness Standards

The Problem

Secondary math teachers in the district are encouraged by administrators and school leaders to use data in all aspects of their teaching. Teachers use data in multiple ways: they use data to inform them of strengths and weaknesses in their own instruction, they use data to identify students who need intervention and enrichment, and they use data to target how to

ultimately impact student learning and performance. Additionally, teachers are encouraged by administrators and district leaders to incorporate the use of data with their students. At a district meeting, the district's Executive Director for Secondary Education observed that having students track their own data on learning throughout the unit would be a powerful strategy (personal communication, C. Wunderlich, November 7, 2018). Some teachers have even incorporated student data use into their personal teacher evaluation goals. As a result, a majority of sixth, seventh, eighth, and algebra I math teachers in the district involve students in tracking their own data in the classroom in some way, but the way this is done with students and the data that is used for the practice varies significantly between teachers and campuses.

Unfortunately, because little evidence exists on the practice, the incorporation of student data-use is rarely based on research; nor, does it appear to be based on the research of what teachers hope to accomplish by using this practice by being grounded in theories of motivation or goal achievement. Finally, the practice does not seem to be well grounded in other research such as theories that support a growth mindset or formative assessment.

Relevant History of the Problem

The scope of involving students in monitoring and tracking their own data has grown and has taken on many different forms during the past five years in the district. While it is believed that the reasons teachers integrate this practice are ultimately to benefit student learning and growth, the ways in which it is practiced, and the data that is used with students, do not necessarily support this goal. Teachers describe that the reasons for integrating student data-use in their classrooms is to help students improve in their learning and to encourage students to take ownership of their own learning, but the contexts for how this is occurring do not always support this outcome.

For example, if an eighth grade math teacher chooses to have students track grades on unit tests, and a student receives a grade of 80 on the unit two test covering equations and a grade of 88 on the unit three test on linear functions, does this show improvement or growth? Or do the differences in the content covered on these units impact the outcomes? Further, in the spring, when the student tracks his or her data on the unit eight test on transformational geometry and receives a 75, does this mean that the student is now not improving? Or again, is this related to the content on transformational geometry?

In another scenario, an eighth grade math teacher chooses to have students' track mastery on learning standards rather than on unit test grades. The student tracks mastery of solving equations and finds that when the equations involve integers, he or she consistently struggles with those problems. Over time, the student continues to track this data and eventually is able to master solving equations with integers. Is this a better representation of improvement in learning or is tracking unit test grades?

Both types of data-use, tracking of grades and tracking of learning on content standards, are utilized in math classrooms in the district; however, the tracking of grades is far more prevalent in secondary math classrooms. Additionally, when the tracking of learning standards does occur, it mostly occurs at the end of a unit from data on a unit test when learning has already occurred. Because SIDU is a practice that is becoming more common in the district and seems to be a practice that will continue to be embraced by teachers in some way, it is critical to understand the contexts for the type of data-use that is both beneficial to students and fulfills the goals teachers identify for its use.

Significance of the Problem

Currently, the way math teachers involve students in their own learning data varies greatly within the district. During my five years as the district Math Coordinator, I have observed many different versions of students tracking and analyzing their own data. It is believed that math teachers in the district ultimately want to impact student learning and want their students to be successful, and it is generally believed that the practice of involving students in their own data is beneficial because this practice is not only encouraged by many educational policymakers, but educational administrators as well; but, the ways this is enacted in the district do not always seem to align with what is best for student learning and growth.

Because involving students in tracking and analyzing their own data has the potential to impact student motivation and how they perceive their learning, understanding the impact of this practice for students is critical (Jimerson & Reames, 2015). In some instances, it is also possible that the contexts for student involvement in data use could have negative impacts on student learning and growth, and it is also possible that the impacts may vary depending on particular student characteristics (Jimerson et al., 2016; Jimerson & Reames, 2015), so working to change these practices in the district is necessary. Ensuring that teachers understand these contexts and are utilizing student data use that benefits students is important.

Understanding teacher motivations for involving students in their own data and in what contexts it is most beneficial for student learning and growth is necessary (Jimerson & Reames, 2015). If the practice undermines these goals and has a negative effect on student learning and growth, this must be addressed in the district. Further, if supporting student growth and encouraging ownership of student learning is the ultimate goal of teachers in involving students in their own data, the practice should ultimately be grounded in theories and research supporting

these outcomes, but it does not appear that this is the case. A practical, student involved data use practice that aligns to research-based practices to ultimately support student learning and growth, while at the same time supporting the reasons for why teachers employ such practices, is long overdue in the district.

Research Questions

The following questions will guide this study:

1. How, why and to what extent are the district's sixth, seventh, eighth, and algebra I math teachers currently using student-involved data in their classrooms?
2. What interactions are observed in classrooms implementing a mastery oriented student-involved data use intervention using formative assessment?
3. What benefits, limitations, and modifications do teachers identify for future use of mastery oriented student-involved data use using formative assessment?

Personal Context

Researcher's Role and Personal History

I am currently the district Math Coordinator working primarily with secondary math teachers by conducting professional development, attending professional learning community meetings, and providing coaching based on data and observational. My role also involves writing secondary math curriculum and creating district level tests, which are used to assess secondary math instruction in the district. I have been in this role for the past five years and spent one year in the district prior to this position as a campus instructional coach. I also have an additional four years in another district as an instructional coach and intervention specialist and have ten years of teaching experience.

As part of this field-based action research study, my role is as an insider with personal knowledge about the issue. I view the action research process as "…a way to deepen [my] own reflection on practice toward problem posing, problem solving, and professional development" (Anderson, Herr, & Nihlen, 2007, p. 9). I also see this action research as a means for sharing practices with other teachers in the district (Anderson et al., 2007). Because involving students in data use is enacted in many different ways in math classrooms in the district, I hope to refine this work further in order to move the work ahead and explore ways to use this practice that will benefit both teachers and students.

Journey to the Problem

My journey to the problem began when I began teaching algebra I with an end of course examination (EOC) in a suburban north Texas school district in the mid 1990's. The district's EOC scores were an abysmal 39% passing rate. As an algebra I team, my colleagues and I purposefully worked to improve these scores and were very targeted about teaching algebra I in a standards-based framework. I implemented daily warm-ups in my classroom that included follow-up feedback and discussions with students. I also collected these daily warm-ups and assessed them to specifically target where students were struggling. Although this was labor intensive, my students were very successful. I also found that I enjoyed teaching even more than before because it was targeted, specific, and goal oriented toward specific learning standards.

Several years later, I moved to the Houston metropolitan area and became a teacher, then a campus instructional coach in a large suburban school district. In my instructional coach role, I presented professional development to teachers on campus at various intervals throughout the school year. During this time, I read *The Art and Science of Teaching: A Comprehensive Framework for Effective Instruction,* by Robert J. Marzano. Marzano (2007) discusses the

importance of setting learning goals with students and encourages teachers to have students track their own progress on these goals. Marzano (2007) provides examples of two types of tracking students can employ and describes how teachers can use the tracking charts with students in their classrooms. Marzano (2007) linked the tracking of student progress to the use of formative assessments because of the impact formative assessment has on student learning. Formative assessments occur during the learning process and provide feedback to the student (and the teacher) about the learning that is occurring (Wiliam, 2011). My familiarity with the research on the impact of formative assessments on student learning prompted me to organize and present a professional development session sharing the idea with teachers of having students track their own learning data. Several teachers integrated this idea into their classrooms. I did not probe further at the time to explore the research on the practice of involving students in tracking their own data, but fully believed that involving students in this process would positively impact their learning.

When moving to my current position as the district Math Coordinator for a suburban central Texas school district, I found that a few secondary math teachers in the district were integrating this process in their classrooms, but the focus was primarily on tracking performance on unit test grades. Additionally, a major initiative in the district at the time focused on integrating Langford Quality Learning Tools, which are techniques and tools used to focus on continual improvement (Langford, 2014). The techniques and tools include ways to analyze processes, chart progress and learning, and encourage ownership of learning by administrators, teachers, and students (Langford, 2014). In my role, I attended this training along with select teachers in the district. One of the tools presented was a Capacity Matrix, which is a tool used by students to track their own learning (Langford, 2014). To support this initiative, I created

samples of these for each math grade level and shared with grade level teachers to encourage this as part of the district initiative. Several teachers integrated the Capacity Matrix into their classroom practices and used it with students that year, but have since abandoned its use.

I have now been in my role as a Math Coordinator for five years and spend a great deal of time in classrooms and planning with teachers. SIDU has become a prevalent practice in math classrooms, especially in STAAR tested grade levels. The practice is enacted in many different ways, with different documents, and with different types of data. While I do understand why some teachers have students track their grades on unit tests, I grapple with this being a true representation of student learning. Each unit test in math covers very different content, and a grade on a unit test seems an obscure way to measure improvement in specific areas of student learning, especially when each of the units in math cover such diverse material, but this seems to be the preferred data that teachers have students track. What I see less of in the district is the involvement of students in monitoring and tracking their progress on math learning standards during the learning process. Because the practice of SIDU is prevalent in the district, and teachers seem to have adopted it, I foresee it being a continued practice in some way, and so student tracking and monitoring of data needs to be enacted in a way that is best for students, but is also useful for teachers.

Additionally, as district Math Coordinator, I continually support and encourage the discussion and study of cultivating a growth mindset in math. Not only is encouraging a growth mindset a predominant topic in education currently, but the State of Texas Assessment of Academic Readiness (STAAR) in math and reading have also moved to measuring student growth from year to year for accountability purposes. To support this work, our district math department conducted a district-wide book study for math teachers using the book *Mathematical*

Mindsets: Unleashing Students' Potential Through Creative Math, Inspiring Messages and Innovative Teaching (Boaler, 2015). This was followed up the next year with a book study utilizing *The Growth Mindset Coach: A Teacher's Month-by-Month Handbook for Empowering Students to Achieve* (Hundley & Brock, 2016). Many teachers have embraced this work and have made positive strides in encouraging students to adopt growth mindsets in their classrooms.

Finally, because data use is a prevalent practice and has been embraced in the district, I have recognized that SIDU practices will continue to be embraced by teachers. I also see that many math teachers are now striving to support a growth mindset in their students, while current SIDU practices may not necessarily support this thinking. A shift for framing SIDU practices through the lens of encouraging a growth mindset and learning growth, rather than through the lens of performance and grades, calls for further exploration. Because the use of formative assessment has a strong research base in supporting student learning, integrating SIDU practices that emphasize learning, but are grounded in research-based formative assessment practices, holds promise to support what teachers hope to accomplish while supporting student growth.

Significant Stakeholders

The most significant stakeholders in the case study are the five teachers participating in the target intervention and the students they teach. These teachers want their students to learn and to take ownership of their own learning, as well as to be motivated and have a growth mindset in math. If students use their own learning data, it should be meaningful and provide them with a sense of growth and success, rather than be deflating or demotivating. The type and the way data is utilized with students ultimately should be valuable and informative to both students and teachers and promote learning and growth.

Other stakeholders include the campus administrators and the campus instructional coach because their focus is for students to learn grade level mathematics content as well as to perform well on the State of Texas Assessment of Academic Readiness (STAAR). Campus leaders also want for data to be meaningful and useful to students and teachers in order to promote learning.

Stakeholders also include district students, teachers, and leadership at large because of the information and recommendations produced from this study. In conducting the study, the way involving students in their own data will be explored and further refined in order to impact student learning and growth, while also meeting the needs of teachers.

Important Terms

Formative Assessment – the various practices used by teachers and students to provide information for modifying teaching and learning

Fixed Mindset – the belief that intelligence and talent are fixed

Growth Mindset – the belief that intelligence and talent can be improved through hard work and perseverance

Mastery Goal Orientation – an orientation of goals that focus on learning and improvement in relation to the learner

Metacognition – awareness, understanding, and regulation of one's own thought processes

Motivation – the reason or reasons for why one does or acts in a particular way

Performance Goal Orientation – an orientation of goals that focus on performance or grades in relation to others

Self-Regulated Learning – learning oriented toward goals that occur from the thoughts, feelings, and behaviors of the learner

State of Texas Assessment of Academic Readiness (STAAR) – the Texas state assessment that measures what students have learned in the state content standards

Student Involved Data Use (SIDU) – a process where teachers involve students in tracking and analyzing their own learning data

Texas Essential Knowledge and Skills (TEKS*)* – the Texas state standards outlining what students should know and be able to do at a particular grade level in a particular content

Closing Thoughts on Chapter I

Data-use continues to occupy a prominent place in education practices today. Because teachers have increasingly involved students in collecting and analyzing their own data, understanding the benefits and the risks of random implementation and use, as well as the contexts in which it could benefit both teachers and students is necessary. Because the use of formative assessment practices have been proven to positively impact student learning (Black & Wiliam, 1998b), integrating the use of formative assessments into SIDU practices needs further exploration, but in a way that supports a growth mindset for students and is also useful and easily implemented for teachers.

I do not foresee the practice of using formative assessments as the data for SIDU as an easily integrated practice. In fact, one teacher shared with me how she integrated this practice at the beginning of last year, and then it became so much to keep up with that she abandoned it after the first few units (S. Hoover, personal communication, November 5, 2018). A second teacher shared with me that she would really like to have students track their data on TEKS, but just doesn't have the time to put everything together to make it happen (C. Burger, personal communication, February 7, 2019). Integrating this practice seems to be easily done at the end of a unit test, and can even involve breaking down data into learning standards at that time, but it is

not easily done consistently throughout the learning process. Because the positive impact of the use of formative assessment has been thoroughly researched, exploring teacher-friendly ways to integrate the formative assessment process into SIDU seems to hold promise.

CHAPTER II

REVIEW OF SUPPORTING SCHOLARSHIP

Although student-involved data use (SIDU) is encouraged by educational leaders and practiced by many teachers, little research exists to support its benefits or to define how it is best implemented in the classroom (Jimerson & Reames, 2015). On the other hand, the use of formative assessments has been thoroughly studied and has a strong research base supporting its benefits and how it is best enacted in the classroom with teachers and students (Wiliam, 2011). An integration of SIDU with a mastery orientation by using the data produced from formative assessments on learning standards promises to be a better alternative for the contexts by which SIDU is enacted in classrooms, rather than SIDU contexts with a focus on performance and grades. Further, use of formative assessment data for SIDU practices, rather than SIDU tracking performance and grades, has the potential to encourage a growth mindset in students as well.

Relevant Historical Background

The use of data in the United States to promote continual improvement can be traced back to the total quality management (TQM) movement of the 1950's (Hackman & Wageman, 1995; Neves & Nakhai, 1993). With the advent of increased education accountability measures, educational leaders began to embrace the use of data and TQM strategies (Park, Hironaka, Carver, & Nordstrum, 2013). In line with TQM practices, the Malcolm Baldridge National Quality Award and the "Education Criteria for Performance Excellence" was introduced in 1987 and defined standards for collecting and analyzing data, goal setting, and measuring progress toward specific goals (Baldrige Performance Excellence Program, 2015; Neves & Nakhai, 1993). The standards set forth in the Baldrige framework can be found today in many recommended resources and materials outlining SIDU contexts and practices (Jimerson & Reames, 2015).

Jimerson and Reames (2015) explain:

> Understanding the history and rise in popularity of SIDU is important for two reasons. First, practitioners and researchers should understand that while these practices could have arisen from sharing of the student-centered practices of special educators, or from the application of classroom-based formative assessment practices, they more likely have ‘‘trickled down’’ from the accountability-centered practices of business, industry, and educational policymaking (p. 296).

Although limited empirical research exists on SIDU, The Institute of Education Sciences What Works Clearinghouse Practice Guide recommends, “Teachers should provide students with explicit instruction on using achievement data regularly to monitor their own performance and establish their own goals for learning” (Hamilton et al., 2009, p. 19). The guide refers to two research studies as evidence of positive effects for this practice. The first study found positive evidence with students charting data; although, other implemented practices were deemed to have possibly influenced the results. The second study involved an online tool for tracking data, but results were inconclusive (Hamilton et al., 2009). Although the practice guide gives the evidence for use a low rating, it includes this practice as one of five recommendations for increasing student achievement. It further explains that the practice of involving students in monitoring their own data can help motivate students and provide them with ownership of their own learning (Hamilton et al., 2009).

Alternatively, formative assessment has a long history in education. Michael Scriven (1967) first referred to formative evaluation in relation to improving the curriculum, then Benjamin Bloom (1969) extended this idea by suggesting the use of formative evaluation by teachers and students during the learning process and that it be kept separate from grading. Research continued on formative assessment over the years following, but in a 1998 study of existing research on formative assessment, Black and Wiliam “…concluded that the research

suggested that attention to the use of assessment to inform instruction, particularly at the classroom level, in many cases effectively doubled the speed of student learning" (Wiliam, 2011). Black and Wiliam (1998) further found that greater improvement occurred when students were the ones involved in the evidence produced from formative assessments.

Alignment with Action Research Traditions

McCutcheon and Jung (1990) describe the goals of action research as "…the understanding of practice and the articulation of a rationale or philosophy of practice in order to improve practice" (p. 148). The major goal of this study is to improve the practice of SIDU in secondary math classrooms in the district. In alignment with action research traditions, the research study was conducted by a researcher who is an "insider" to the site of the research with those who have a vested interest in the study (Anderson et al., 2007).

The research process follows Lewin's (1948) four-stage action research model by beginning with an exploration and understanding of the problem, followed by planning an intervention to take action to change the problem, and then observing the results to identify what needs to be improved upon in the future. Because SIDU is a recommended practice by many in the educational community, but has not been clearly articulated, this action research study also empowers those who are directly involved in its use (teachers) to have an impact on shaping the practice moving forward. Anderson et al. (2007) posit, "We see action research as an opportunity to make the voices of those who work closest to the classroom heard" (p. 7).

SIDU is currently a practice used by many teachers in secondary math classroom in the district. Most teachers, though, integrate SIDU by having students track and analyze grades, while very few teachers use SIDU focusing on student learning standards. Identifying and clarifying how SIDU tracking of learning standards can work practically with students aligns

with the concept that action research is a way to collaboratively discover something that really works with teachers in the classroom (Anderson et al., 2007).

Theoretical and Conceptual Framework

Three theoretical frameworks ground this study: goal orientation theory, mindset theory, and change theory. The goal orientation theory has been widely researched and describes how students respond to learning (Ames, 1992; Ames & Ames, 1984; Ames & Archer, 1988; Nicholls, 1979; Pintrich, 2003; Pintrich, 2004). A student's goal orientations explain the reasons why a student is motivated to engage in and complete a task (Pintrich, 2003). There are two types of goal orientations: mastery and performance. Mastery goals focus on learning and improvement relative to the learner; performance goals focus on achievement in comparison to others (Pintrich, 2003). Mastery goal orientations are associated with greater positive effects for students than are performance goal orientations (Ames, 1992); although, some research suggests that both types of orientations may be beneficial depending on the situation (Harackiewicz, 2002).

The second theory framing this study is the mindset theory. The mindset theory posits that students either view intelligence as "fixed" and something that they are born with and are not able to change, or they view intelligence as something that they can improve upon over time, and thus have a "growth" mindset (Dweck, 1986). Students who have a growth mindset seek to improve their learning, value effort, accept challenges, and have more resilience when meeting challenges; in contrast, students with fixed mindsets view effort as a sign of low ability, do not pursue challenges, and give up more easily in situations that cause them to struggle (Blackwell, Trzesniewski, & Dweck, 2007; Butler, 2000; Hong, Chiu, Dweck, Lin, & Wan, 1999; Robins &

Pals, 2002). Students who have a growth mindset perform better academically, and are especially true for students facing challenges (Blackwell et al., 2007; Claro, Paunesku, & Dweck, 2016)

The third theory framing this research is change theory as discussed by Hall and Hord (2014) regarding organizational change. Hall and Hord (2014) identify the importance of leadership in supporting change and having an understanding that organizations do not change, but rather the people in the organization change. They further suggest that using interventions with proper support for those undertaking the implementation during the process of change can help promote success of, and alleviate resistance to, change (Hall & Hord, 2014). They further emphasize that change is complex, requires time to affect, and requires a shared vision amongst leaders.

A final framework imperative for consideration for this study is Guskey's (1986) findings on change as it relates to directly to teachers. Guskey (1986) posits that teacher change is only likely to occur after a teacher has evidence of the change's effects on student learning. These changes come from specific practices in the classroom and the changes to student learning outcomes, and not directly as the result of staff development efforts.

Guskey (1986) theorizes that change for teachers comes through understanding and experience in the classroom. Guskey (1986) states, "Practices that are found to 'work', that is, those leading to desired learning outcomes, are retained; others are abandoned" (p. 445). For teachers to adopt a practice, it must be perceived as useful and positively affect student learning.

Most Significant Research and Practice Studies

Student Involved Data Use (SIDU)

According to Jimerson, Cho, and Wayman (2016), SIDU is a process where "…teachers work to purposefully and directly engage students in the tracking and analysis of their own

learning data" (p. 413). Throughout the SIDU process, teachers help students use their own data to set goals, monitor their progress, and reflect on their learning in order to inform actions for future learning (Jimerson & Reames, 2015; Marsh et al., 2016). SIDU takes on many forms in the classroom including charts, graphs, and data binders, which may be displayed publicly in the classroom or kept private in a data folder or binder (Jimerson et al., 2016). The data collected by students may also be used to facilitate conferences between the teacher, student, and parent to discuss learning progress and goals (Jim Shipley & Associates, 2013).

Although limited empirical research exists on SIDU, The Institute of Education Sciences What Works Clearinghouse Practice Guide recommends, "Teachers should provide students with explicit instruction on using achievement data regularly to monitor their own performance and establish their own goals for learning" (Hamilton et al., 2009, p. 19). The guide refers to two research studies as evidence of positive effects for this practice. The first study found positive evidence with students charting data; although, other implemented practices were deemed to have possibly influenced the results. The second study involved an online tool for tracking data, but results were inconclusive (Hamilton et al., 2009). Although the practice guide gives the evidence for use a low rating, it includes this practice as one of five recommendations for increasing student achievement. It further explains that the practice of involving students in monitoring their own data can help motivate students and provide them with ownership of their own learning (Hamilton et al., 2009).

SIDU is also a more recent educational practice in which its use and implementation in the classroom has preceded the research surrounding it (Jimerson & Reames, 2015). While teachers continue to employ various forms of SIDU practices, the way in which SIDU is best implemented, and in what contexts, continues to be developed, thus creating a "gap between

research and practice" (Jimerson & Reames, 2015, p. 282). At present, research is also limited on the advantages and limitations of its use (Kennedy & Datnow, 2011; Marsh et al. 2016; Park, Carver, & Nordstrum, 2013) and little is still known about the effects of SIDU on students (Jimerson & Reames, 2015).

In one of the earliest SIDU studies, Kennedy and Datnow (2011) sought to understand the various ways in which students engage in data use and are involved in data based decision making (DBDM) efforts. The study involves eight schools considered to be adept at data usage. The authors identify and categorize three different ways data is used by students. One of these categories closely aligns to SIDU practices defined in the literature on the subject. The authors found that seven of the eight schools employed processes aligning with SIDU by having students track and monitor their own learning data, followed by employing SIDU practices by setting goals for improving after reflecting on their own data (Kennedy & Datnow, 2011). This study confirms that SIDU practices found commonly in schools include elements of self-monitoring, self-reflection, and goal setting (Jimerson & Reames, 2015).

In a study of SIDU use by middle school teachers, Marsh et al. (2016) examined how teachers involved students in data use. Their findings first reveal that many teachers implement the use of SIDU because they believe it will result in improved student effort and motivation (Marsh et al., 2016). Marsh et al. (2016) further find that two-thirds of the samples gathered focus on data relating to student performance (grades) rather than student mastery (learning outcomes), and posit that a focus on performance, when viewed through an achievement goal theory perspective, has the opposite effect on motivation for students with a performance orientation; when SIDU employs a mastery learning perspective, which focuses on effort and improving learning outcomes, student motivation and learning improves. Finally, when teachers

are supported through coaching and professional learning, SIDU practices are more likely to employ a mastery-oriented approach (Marsh et al., 2016).

In a more recent study, Jimerson et al. (2016) explore ways in which teachers learned how to involve their students with data. The study involves 11 teachers on six campuses in five different school districts. All teachers in the study were currently using SIDU practices and were recommended as model teachers by district or campus leaders with regard to data use. Teachers report learning about SIDU in various ways including: 1) professional learning specific to SIDU practices, 2) professional learning related to data use in general, 3) professional learning communities or teacher teams, and 4) self-study (Jimerson et al., 2016). Teachers also report that although SIDU was not mandatory, it was encouraged, and some were also expected to keep data folders. Teacher responses for why they were using SIDU vary from improving student motivation, putting students in charge of their own learning, and increasing student effort because of competition either with themselves or with other students (Jimerson et al., 2016). Finally, Jimerson et al. (2016) found that understandings and implementation of SIDU practices, along with a goal for using SIDU, varied greatly among teachers.

In their research on the evidence of SIDU practices, Jimerson and Reames (2015) investigated current literature and research on recommended SIDU classroom practices and found that SIDU practices mostly included: "1) a structured, nested inquiry cycle – usually the Plan-Do-Study-Act cycle – guided by specific, measurable goals; 2) the use of student data folders/binders; 3) a focus on guided reflection specific to learning strategies; 4) semi-public displays of data; and 5) data-informed parental involvement" (Jimerson & Reames, 2015, pp. 289 – 290). However, through their research, the authors discovered the evidence base on the

actual use of SIDU by teachers in the classroom to be somewhat unclear (Jimerson & Reames, 2015).

Although many teachers believe SIDU to be worthwhile, they also experience challenges with its implementation and day-to-day use in the classroom (Jimerson et al., 2016). At the forefront of these challenges is the issue of time. While teachers may feel that the benefits are worth the time invested for implementing SIDU, they also struggle with the time spent on SIDU at the expense of other important aspects of teaching such as instruction in content, lesson planning, and making parent contacts (Jimerson et al., 2016). Teachers also find that some students struggle with tracking, using, and reflecting on their data and do not have the math skills to understand what the data actually means, while other students struggle when the data indicates they are not improving (Jimerson et al., 2016).

Additional research is needed to fully understand SIDU in classroom practices and to recommend best practices for its use and implementation in order to promote improvement in student learning (Marsh et al., 2016). Marsh et al. (2016) theorize, "despite the limitations of the research base, there is nonetheless a general assumption that student involvement in data use is beneficial" (p. 244).

SIDU also shares characteristics with other research-based educational practices, including formative assessment and self-tracking in special education, but is not just an extension of these practices, and therefore calls for further study and guidance going forward (Jimerson et al., 2016). Like SIDU, special education self-tracking involves students' monitoring and tracking their own unacceptable or undesirable behaviors with a focus on improvement (Jimerson et al., 2016). Students in special education track their own behavioral data in order to learn to replace old behaviors with new, acceptable behaviors (Sugai et al., 2000). Unlike SIDU, special

education student tracking is released over time as new behaviors replace old ones. While special education tracking and self-monitoring share similarities with SIDU, SIDU is unlike special education tracking in that it is meant to encourage students to continue the practice of tracking and monitoring their improvement over time, rather than eventually abandon the practice (Jimerson & Reames, 2015).

SIDU also shares similarities with formative assessment. Formative assessment is the use of assessments to support specific and timely feedback to both the student and the teacher in order to inform and guide ongoing learning (Black & Wiliam, 1998a; Shute, 2008; Wiliam, 2011). Like SIDU, formative assessment also involves students in the process of goal setting and working toward achievement of those goals (Wiliam, 2011). Different from formative assessment, though, SIDU has been found to sometimes focus on performance in the form of grades and test scores rather than improvement toward learning goals (Jimerson & Reames, 2015) and SIDU data may also be displayed publicly for others to see (Marsh et al., 2016). Neither of these practices is found in formative assessment practices.

Although current research on SIDU is limited, teachers are implementing SIDU practices regardless of what is known and the results that may be produced (Jimerson & Reames, 2015). In fact, districts are commonly embracing the use of "data walls" and "data folders" and providing training on SIDU practices without clear direction from research for how these practices should be implemented (Jimerson & Reames, 2015). Furthermore, teachers are also unclear as to how to correctly implement SIDU and are implementing the practice with limited resources and ambiguous goals (Jimerson et al., 2016). It is critical to identify "…potential benefits of SIDU as well as the possible dangers of implementing SIDU in haphazard ways" (Jimerson & Reames, 2015, p. 281) in order to support student learning.

Formative Assessment

Spanning three decades, the research on formative assessment demonstrates that it is a highly effective strategy for improving student achievement (Black & Wiliam, 1998a; Shute, 2008; Wiliam 2011). Black and Wiliam (1998b) define formative assessment as "all those activities undertaken by teachers – and by their students in assessing themselves – that provide information to be used as feedback to modify teaching and learning activities" (p. 140). They further describe formative assessment as "the heart of effective teaching" (Black & Wiliam, 1998b, p. 140). While most discussions and research on formative assessments involve what teachers do in the formative assessment process, Wiliam (2011) reminds us that formative assessment also includes students in the process.

Although formative assessment is sometimes referred to as a tool used in the process of identifying what students learn, Wiliam (2011) clarifies that a formative assessment is not the actual tool or assessment itself, but instead is formative based on the purpose that the assessment serves.

Wiliam (2011) states

> An assessment functions formatively to the extent that evidence about student achievement is elicited, interpreted, and used by teachers, learners, or their peers to make decisions about next steps in instruction that are likely to be better or better founded, than the decision they would have made in the absence of that evidence (p. 43).

Cowie and Bell (1999) describe formative assessment as "the process used by teachers and students to recognise and respond to student learning in order to enhance that learning, during the learning" (p. 32). In this way, any form of student assessment can be considered formative if it is used to inform teachers about their instruction and student learning, or to inform students about their learning during the actual learning process.

Black and Wiliam (1998b) explain that self-assessment is an essential part of formative assessment and that three elements are necessary for anyone trying to learn: "…recognition of the *desired goal*, evidence about *present position*, and some understanding of a *way to close the gap* between the two" (p. 143). In order for formative assessment to be impactful, students have to be trained in ways to self-assess so that they can understand why they are learning and understand what they need to do to achieve (Black & Wiliam, 1998b). This clearly identifies the involvement of students in the formative assessment process.

In an early review of 21 research studies on formative assessment, Fuchs and Fuchs (1986) found that student learning increased substantially when teachers assessed students two to five times per week; and, when teachers determined ahead of time how they would review and use this data, gains on student learning doubled. Further, when teachers graphed the student learning data, student learning increased almost three times as much (Fuchs & Fuchs, 1986).

More recent research highlights other significant findings on the use of formative assessments. First, Wiliam (2011) posits that when the varying settings and circumstances in which formative assessments are enacted, even when there are slight differences or oversights in its use, significant gains in student achievement still occur. Second, formative assessment has been found to be even more impactful for low achieving students and thus narrows the gaps between low and high-achieving students and therefore improves learning for all students (Black & Wiliam, 1998b).

Effective formative assessment strategies can happen in various ways in the classroom. Leahy, Lyon, Thompson, and Wiliam (2005) posit that different teachers enact formative assessment practices in different ways and state that "…there could be no one-size-fits-all

package" for formative assessment practices (p. 20). Leahy et al. (2005) define five key strategies for formative assessment:

1. Share and clarify learning objectives and criteria for meeting the objectives with students
2. Create discussions and learning activities to produce evidence of learning
3. Provide feedback to move learning forward
4. Activate learners as learning resources for each other
5. Activate learners to own their own learning

While formative assessment practices include all of these strategies, Wiliam (2011) supports that the fifth strategy – activate learners to own their own learning – has the potential to produce significant improvement on student achievement.

The research on formative assessment shows the impact it has on student learning, even when variations in the way it is enacted occurs. Formative assessment also provides powerful information for the teacher on where students are in their learning and where to make adjustments in their instruction. Finally, formative assessments provide an avenue for students to be aware of their learning and enhance ownership of their own learning. Chow (2010) posits, "Instead of being victimized in the assessment process, learners feel they are in charge of it."

Self-Regulated Learning

In order for students to own their own learning, they must become self-regulated learners. Zimmerman (2002) portrays self-regulated learners as being "…proactive in their efforts to learn because they are aware of their strengths and limitations and because they are guided by personally set goals and task-related strategies…" (p. 66). Students who are self-regulated learners are more likely to "…succeed academically…" and "…view their futures optimistically"

(Zimmerman, 2002, p. 66). Boekaerts (2006) describes self-regulated learning as the ability for a learner to be able to coordinate his or her ability, effort, and actions together in order to meet learning goals. Butler and Winne, (1995) posit that "the most effective learners are self-regulating" (p. 245), but the ability for students to become self-regulated learners encompasses multiple influences including metacognition, motivation, and a focus on growth, which Wiliam (2011) posits is not always an easy task to accomplish. Zimmerman (2002) identifies three stages of self-regulated learning: goal setting and planning strategies for learning, focusing on performance of the strategies for learning, and self-regulating where the learner evaluates his performance and satisfaction in relation to the learning.

Although much of their research involves supporting students who struggle with writing, Harris and Graham's Self-Regulated Strategy Development (SRSD) model has a strong research-base and has been proven to be an effective method for developing students' self-regulation strategies (Harris, Graham, & Mason, 2003). One of the major strategies identified in the SRSD model includes helping students: 1) set writing goals, 2) self-instruct, which involves students identifying what needs to be done to accomplish the set goals, and 3) self-monitor, which involves students counting specific parts of the writing elements used during the writing process (Harris, Graham, & Mason, 2003). SRSD has shown positive outcomes for students with attention deficit hyperactivity disorder (ADHD) (Taft & Mason, 2010), and has also shown positive results in other content areas, including mathematics (Case, Harris, & Graham, 1992)

Certain teacher actions can contribute to learners being self-regulated. This process involves teachers' abilities to adjust from one who merely shares knowledge to one who facilitates and helps students to become independent learners (Chow, 2010). Wiliam (2011) suggests that there are certain teacher actions that can influence students to be self-regulating:

1) Share learning goals with students so they can monitor their own progress

2) Encourage in students that ability is not fixed and that they can get smarter

3) Make it difficult for students to compare themselves to each other

4) Provide feedback with direction for future action

5) Take every opportunity to transfer ownership of learning to the student

Wiliam (2011) posits, "Although we don't know everything about the most effective learning environments, the existing research on cognition and motivation provides clear and strong evidence that activating students as the owners of their own learning is an essential component" (p. 151).

Growth Mindset

In a culmination of over thirty years of research, Carol Dweck (2006) describes the power of people's mindsets on their ability to succeed in *Mindset: The New Psychology of Success.* Dweck (2006) identifies two types of mindsets:

> 1) Fixed Mindset: The belief that we're born with a fixed amount of intelligence and ability. People operating in the fixed mindset are prone to avoiding challenges and failures, thereby robbing themselves of a life rich in experience and learning, and, 2) Growth Mindset: The belief that with practice, perseverance, and effort, people have limitless potential to learn and grow. People operating in the growth mindset tackle challenges with aplomb, unconcerned with making mistakes or being embarrassed, focusing instead on the process of growth (pp. 15 – 16).

In this research, a large number of studies have shown that students who have a growth mindset and believe that they can improve their intelligence, achieve better than students who have fixed mindsets and believe intelligence is a permanent state (Dweck, 2006).

Having a growth mindset has been shown to promote increased learning and achievement in students of all ages, and especially when students face challenging situations or transitions in their schooling (Blackwell et al., 2007; Paunesku et al., 2015). Further, having a growth mindset

has shown to be especially beneficial to students who typically underperform (Good, Rattan, & Dweck, 2012; Paunesku et al., 2015). Finally, in a recent study on growth mindset, Claro, Paunesku and Dweck (2016) not only confirm the relationship between positive academic performance and student's growth mindsets about their intelligence, but also find that this relationship holds true for students who are economically disadvantaged. In fact, some students in the lowest 10th percentile of family income, and who exhibited a growth mindset, achieved as well as students in the 80th percentile of family income (Claro, et al., 2016). Further findings from this study also suggest that students who are economically disadvantaged are more likely to have fixed mindsets (Claro, et al., 2016) – a trend that definitely calls for reform.

The research on mindsets shows that students are generally either concerned with the goal of learning or proving their abilities (Dweck & Leggett, 1988; Haimovitz, Wormington, & Corpus, 2011). Students also view the connection between their efforts and learning differently and they also handle their mistakes and failures differently (Blackwell et al., 2007). All of these factors contribute to a students' fixed or growth mindset.

Fortunately, a growth mindset in students can be improved upon over time and thus improve student achievement (Blackwell et al., 2007). Teaching that encourages a growth mindset has been linked to specific teacher actions in the classroom, including the way teachers praise students, the way they provide feedback, and their messaging about effort and mistakes. Two early studies (Mueller & Dweck, 1998; Kamins & Dweck, 1999) found that students who received praise for their processes and effort, rather than praise for their ability or intelligence as a person, exhibited attributes of a growth mindset and were more focused on learning. Further, students who were praised for their intelligence ended up performing worse overall than those who were praised for their processes and effort. Multiple studies since have also reinforced these

early findings with various groups of students using varying methods (Brummelman et al., 2013, Corpus & Lepper, 2007; Haimovitz & Corpus, 2011).

In a November, 2014 TED Talk, Dweck suggests "praising the process that kids engage in, their effort, their strategies, their focus, their perseverance, their improvement" to encourage a growth mindset in learning (4:09). Research also suggests that when teachers' focus on improvement and effort rather than competition and comparisons in their classrooms, a learners' orientation can be nurtured towards a "growth" mindset (Dweck, 2006).

Growth mindsets can also be fostered in students in varying ways outside the classroom so that students can apply what they have learned to improve their learning and achievement (Blackwell et al., 2007). Training and encouragement on fostering a growth mindset has been shown to produce positive outcomes for students even when students have received as few as one or two online growth mindset lessons (Paunesku et al., 2015; Yeager, Romero & Paunesku, 2013).

Dweck (2017) acknowledges that while the emphasis on encouraging a growth mindset has had significant impact in schools, there have been issues with its implementation; one of the major misconceptions is that a growth mindset is merely about effort. Dweck (2017) emphasizes that effort alone is not necessarily going to improve student learning. Students need to understand that effort is important, but when they struggle, they must then try new strategies or ask for help in learning what they don't understand. Students must have an awareness of what they know and don't know and when they need to try something new or get help and persevere.

To encourage perseverance toward a growth mindset in students, Dweck (2014, November) states, "Just the words "yet" or "not yet," we're finding, gives kids greater confidence, gives them a path into the future that creates greater persistence. And we can

actually change students' mindsets" (5:25). A growth mindset acknowledges that learning is a continuum and that getting something wrong or making mistakes does not mean that learning is over. It means, instead, that learning is a process.

Achievement Goal Orientations

While students' goal orientations for achievement are complex, they generally fall into two categories: mastery goal orientations or performance goal orientations. Students with a mastery goal orientation focus on improvement in learning and are said to have a "growth" mindset and experience mistakes and failures as a temporary condition (Dweck, 2006; Pintrich, 2003). Students with performance orientations focus on grades and performance in relation to other students, and generally view learning as "fixed" and see setbacks as verifying their ability, or lack of ability (Dweck, 2006; Pintrich, 2003).

Empirical research suggests that a mastery goal orientation is associated with greater positive effects for students than are performance goal orientations (Ames, 1992; Pintrich 2003; Seifert, 2004). Mastery goal orientations have been linked to higher levels of student self-efficacy, student interest, improved performance, and the belief that effort leads to achievement, and not fixed intelligence (Ames, 1992; Dweck & Leggett, 1998; Pintrich, 2003; Seifert, 2004). In contrast, performance goal orientations have been linked to less desirable outcomes such as a focus on comparison to others, the avoidance of appearing incompetent, and lower motivation and performance (Anderman, Andrzejewski, & Allen, 2011; Ciani, Middleton, Summers, & Sheldon, 2010; Meece, Anderman, & Anderman, 2014); although, some studies have linked performance goals to better performance (Harackiewiez, Barron, Carter, Lehto, & Elliot, 1997; Harackiewicz, Barron, & Elliot, 1998), but in these studies, a distinction is made in performance goal oriented students where some students are motivated by their performance in relation to

others and other students are motivated by their avoidance of looking incompetent. When this distinction is made, performance adversely affects the students who are motivated by the avoidance of appearing incompetent (Elliot & Harackiewicz, 1996; Elliot, 1997; Elliot & Church, 1997; Harackiewicz et al., 1998).

When looking at goal orientations in the classroom, it is also possible that students may not only have a mixture of performance and mastery goal orientations, but different levels of both of these orientations as well (Meece & Holt, 1993; Pintrich & Garcia, 1991). In fact, Pintrich (2000) suggests that mastery and performance goals may also be somewhat positively related in certain instances, and it is also possible that students could even work from a mastery and performance goal orientation at the same time (Pintrich, 2003). Harackiewicz et al. (2002) suggest that it is also possible that in certain situations both types of goal orientations may be beneficial to students, but more research is needed in this area.

In the majority of studies, though, students who are only concerned about their grades and doing better than others without concern for mastery and learning tend to experience overall adverse affects in the classroom, while students who are concerned with performance while also being focused on mastery and learning do as well as those focused on mastery and learning alone (Pintrich, 2003). There is also evidence suggesting that African American and Latino students with performance goal orientations are adversely impacted to greater extents than their peers (Smith, 2004).

The findings on goal orientations indicate that a mastery goal orientation is most beneficial for students and fostering this in the classroom is preferred in order to support students' interest in learning, rather than merely performance in relation to others (Ames, 1992). Teachers who encourage performance goal orientations emphasize student grades in relation to

other students and may post grades publicly; teachers who encourage mastery orientations emphasize development of skills and allow students to redo assignments (Meece Anderman, & Anderman, 2006).

While goal orientations for students are complex, and students may demonstrate both mastery and performance orientations, supporting mastery goal orientations in students, rather than performance goals in relation to others or in the form of grades, produces greater positive outcomes and also focuses on the true intent of schooling, which is learning.

Closing Thoughts on Chapter II

Student-involved data use is encouraged by educational leaders, and has therefore become prevalent in today's classrooms. Additionally, teachers regularly use data to inform them of student learning and performance as well as to inform them of what changes may need to occur in their instruction. It seems a natural progression that teachers are involving students in their own data-use; however, not only has this phenomenon been sparsely researched to recommend best practices, but the way it is utilized and the data that is used with students is extremely diverse and is not always enacted in ways that have been found to be beneficial to students. Because the research on the positive impacts of using formative assessments in the classroom has been thoroughly studied and researched, an integration of these two practices using data with a mastery orientation on learning standards, rather than a performance orientation on grades, holds promise to encourage student learning and growth, rather than encourage a focus on performance; however, the contexts for how this is done with students that is most beneficial must be further explored.

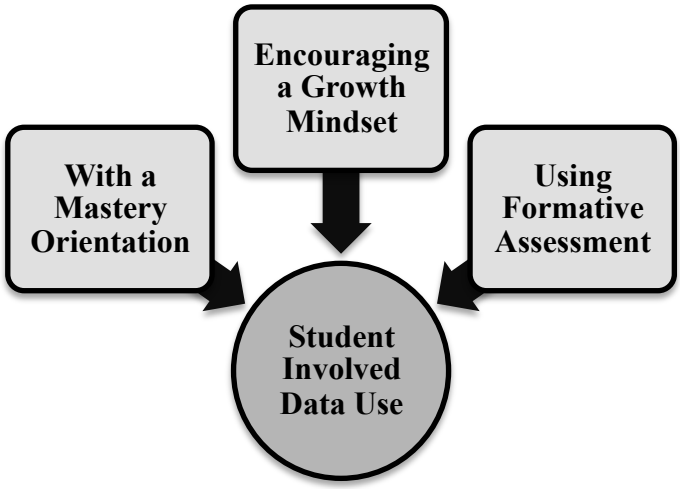
CHAPTER III

SOLUTION AND METHODS

A majority of the district math teachers who utilize SIDU in their classrooms have students' track performance goals, or grades. A plethora of research shows that overall performance goals generally have negative student outcomes (Anderman, Andrzejewski, & Allen, 2011; Ciani, Middleton, Summers, & Sheldon, 2010; Meece, Anderman, & Anderman, 2014). Because the use of formative assessments has been found to positively support improvement in student learning (Black & Wiliam, 1998a; Shute, 2008; Wiliam 2011), creating a SIDU intervention integrating formative assessment practices in order to emphasize a mastery orientation and improvement in learning, rather than performance on grades, promises to be more beneficial to students.

In order for teachers to adopt and use a new practice, though, they must perceive that it is useful to them and their students or the practice is likely to be abandoned (Guskey, 1986), so creation of a SIDU intervention considering why teachers use SIDU so they can see its benefits will be more likely to be adopted and used long-term. Finally, encouraging a growth mindset in math has been a focus in the district for the past several years, so creation of a SIDU intervention encouraging this in students would be advantageous as well, and would further support this work; therefore, the proposed solution is to create and implement a mastery oriented SIDU intervention utilizing formative assessment practices to benefit both students and teachers with an emphasis on encouraging a growth mindset in students as depicted in Figure 3.1. The proposed solution will be used and studied in order to further refine the process for possible adoption and use in the district in the future.

Figure 3.1: Proposed SIDU Intervention



Outline of the Proposed Solution

In my role as district math coordinator, I frequently observe in teachers classrooms and interact with them in informal conversations, weekly planning meetings, and district professional development sessions. My informal interviews and observations on current practices regarding SIDU were that most teachers had students track their data on grades, and very few of them had students track their data on learning throughout the learning process. Because my research on SIDU revealed that having students track grades on performance in the form of grades was not always beneficial to students, I wanted to begin work on reframing the way math teachers in the district have students track data in order to not only support student learning and growth, but to also support what teachers hoped to accomplish when involving students in their own data.

The first step was to conduct a survey to gather information to use as a way to inform the creation of an intervention for a SIDU practice that would benefit students and also support teachers' reasons for using SIDU. Analysis of the survey data revealed that most math teachers were using SIDU in some way in their classrooms. The survey also revealed that the current

SIDU practices employed primarily involved the tracking of grades, which supported what I had informally observed in classrooms and learned in my interactions with teachers. My reason for creation of an intervention was to specifically try to move teachers away from focusing on the tracking of student grades and begin to consider having students' track data on learning standards during a unit of study.

The critical information gathered from the survey, which I did not have an understanding of from my interactions with teachers, was to learn why teachers used SIDU and what their goals were in using the practice with students. I needed this information to help me frame the creation of a SIDU intervention that would support the reasons teachers had students track their data in the first place, but that would be more beneficial to students throughout the learning process while supporting our district focus on encouraging a growth mindset in math classrooms. The survey revealed that the primary reason teachers have students track their own data is so that students will take ownership of their own learning. A large number of teachers also cited that they wanted students to be aware of their strengths and weaknesses and focus on improvement. Other teachers said that having students track their own data allows for students to set goals and to have an awareness of their progress.

Having this information allowed me to research ways that students could track learning data and also support the teachers' goals of helping students become owners of their own learning, identify strengths and weaknesses, set goals, and support student improvement. Finally, a major focus in math in the district has been to encourage a growth mindset in students. Making sure that this was communicated to students in some way on the tracking document was also a primary focus for me as the district Math Coordinator. I created a SIDU tracking document with the intent of supporting all of these elements (Appendix C). The SIDU tracking document is not

meant to be a final version, but is meant to be a starting place for further refinement of a possible district-adopted document after exploring its usefulness with teachers and students.

The SIDU tracking document breaks the sixth grade learning standards down into doable chunks for assessment purposes. In using formative assessments, Leahy (2005) encourages sharing learning objectives and clarifying them for students. While the SIDU document uses the language from the standards, it is also presented in a way that a sixth grader can understand. When introducing the SIDU document to students, teachers will be asked to review the learning standards with students from the document and discuss them with their students.

Teachers will use formative assessment strategies to assess students at least three times a week in their classrooms in order for students to track their progress on the SIDU document. An item bank of math problems will be provided to teachers to use for formative assessments that include multiple choice, open-ended, and writing prompt questions, but teachers will be encouraged to use their own assessments as well. As the student is formatively assessed, the student will either shade in the box above the written standard to show that they got the assessment correct, or they will enter in NY for "not yet" to show that they have not yet mastered the standard. As they improve on the standard, the NY can be shaded over to show that mastery has occurred and getting something incorrect does not indicate failure, but indicates that they have "not yet" fully learned the standard and they have an opportunity to improve. In her work on encouraging a growth mindset, Dweck (2014) describes that the words "not yet" gives students confidence and the persistence to continue trying. The intent of using NY, with the ability to shade over was to communicate to students that not getting something correct was not a fixed situation and is intended to encourage a growth mindset. The shaded in boxes are also situated in an upward column to visually show growth on a standard in an upward trajectory,

mimicking growth in an upward path. All of these processes are intended to support a growth mindset for students.

The SIDU tracking document also has an area for student reflection on the learning standards during the unit to help students assess their areas of strengths and weaknesses and reflect on learning and improvement during the learning process. Teachers were asked to model this process for students initially so that students understand ways they might reflect on their learning. The final section has an area for students to reflect on their learning at the end of the unit to identify strengths and weaknesses and set goals for improvement. While Leahy (2005) identifies that students need to be activated to own their own learning, Wiliam (2011) reinforces that this practice has the potential to produce substantial improvement in student learning because it encompasses elements of self-regulated learning, metacognition, and motivation for students. Having students reflect on their learning and set goals for improvement on the SIDU tracking document also supports the math teachers' goals of SIDU, which include encouraging students to own their own learning, have an awareness of their strengths and weaknesses, improve on their learning, and set goals for improving.

The next step in the proposed solution involves observing the SIDU intervention in selected math teachers' classrooms to examine the SIDU intervention in a natural classroom setting in order to observe use by teachers and students. Prior to the observations and in conjunction with obtaining teachers' informed consents, teachers in the observation group will be given an outline of the study and the guidelines for implementation and use of the SIDU intervention in order to ensure that the intervention is introduced and enacted similarly in classrooms (Appendix D). Teachers will also be given the bank of math problems for the unit to utilize for formative assessments. Teachers will be told that they may use their own assessment

items as well. During this meeting, the teachers implementing the intervention will be allowed to ask clarifying questions and will be asked for and for any recommended modifications to the SIDU document and the SIDU process moving forward.

During the observations, interactions between students and teachers will be observed to illuminate the variations in the way teachers implement and use the SIDU intervention in their classrooms along with the way students are involved in the formative assessment process and the SIDU tracking. Teacher and student actions and comments will be recorded that provide insight into teacher and student processes and thinking during the intervention. As the observer and recorder of the data, my personal insights will be recorded regarding my reactions, reflections, interpretations, and significances of the intervention. At the conclusion of the observations, various samples of completed SIDU tracking documents will be collected for analysis to further illuminate the actual process of how students track the formative assessments, how they reflect on their learning strengths and weaknesses, and how they set goals and plans for improving.

During the week after the observations, a 1½ to 2-hour focus group interview will be conducted to gather feedback and reflections from teachers who participated in the study. The feedback is intended to gather information on the SIDU intervention process and to elicit feedback for modifications and improvements to the intervention for use in the future. Teachers will be asked a series of questions related to the intervention and analysis will seek to identify themes and summarize the feedback for use in making adjustments and modifications for future use.

Justification of Proposed Solution

Allowing teachers to implement SIDU and explore ways in which it works, and doesn't work, is necessary in order to improve practice in the future (Jimerson et al., 2016; Jimerson &

Reames, 2015). Although many teachers believe SIDU to be worthwhile, they also experience challenges with its implementation and day-to-day use in the classroom (Jimerson et al., 2016). Additionally, depending on the type of data being tracked and the classroom environment, SIDU is not necessarily always beneficial to students, nor does it always support the outcomes teachers identify as the reasons for using SIDU (Jimerson et al., 2016; Marsh et al., 2016).

Jimerson et al. (2016) recommend that education leaders provide clear expectations for teachers on proper data usage contexts with students as well as provide support for its implementation and usage. Because many math teachers readily use data and employ SIDU practices using student performance data, providing an alternative, but viable, solution using research-based practices will provide a means of moving SIDU practices forward in ways that benefit both teachers and students. Because formative assessment strategies have a strong research base in improving student learning (Wiliam, 2011), integrating these practices into student data tracking shows promise.

Study Context and Participants

The field-based action research study is situated in a fast-growth, major suburban school district in central Texas. The district encompasses five counties in a geographic area of nearly 600 square miles and surrounds a major interstate highway. The U. S. Census Bureau (2017) lists the major county the district resides in as the second largest county by percent of population increase in the United States. According to the district Superintendent, district growth represents approximately 900 new students to the district each year (personal communication, A. Kim, November 16, 2018).

The participants in the initial phase of the study consisted of 36 math teachers who teach sixth, seventh, or eighth grade math, or algebra I within the district. These teachers were chosen

because teachers in these grades are more likely to employ SIDU with their students because of STAAR testing. A voluntary survey on the use of SIDU in the classroom was sent to all 53 of the districts' math teachers in these grade levels, and from this group, 36 teachers responded to the survey.

The participants in the second and third phase of the study were a purposeful sample of five-sixth grade math teachers from two middle schools in the district. The sixth grade teachers in the sample were chosen for the following reasons:

1. Sixth grade math is a STAAR tested content and grade level.
2. Teachers had varying levels of teaching experience and varied years of teaching sixth grade math.
3. Teachers either did not use SIDU with their students, or used SIDU in different ways.
4. Teachers were from two significantly different campuses demographically and on STAAR performance.

A purposeful sample of sixth grade level teachers was chosen in order to provide information-rich data in similar contexts, sixth grade, so that data across each case could be closely analyzed for patterns and themes (Patton, 2015). Although the group was homogeneous with regard to grade level, they varied with regard to years of experience and their current use of SIDU (Table 3.1).

Table 3.1: SIDU Intervention Teacher Profile

Position	Gender	Ethnicity	Total Years of Teaching	Years of Teaching 6th Grade Math	Current Use of SIDU
Teacher 1	Female	White	1	1	Grades on unit tests
Teacher 2	Female	White	4	3	Grades on unit tests
Teacher 3	Female	White	10	1	None
Teacher 4	Female	White	5	5	All grades per unit
Teacher 5	Female	White	27	10	All grades per unit

Note: Teachers 1, 2, and 3 taught at the same campus. Teachers 4 and 5 taught at the same campus, but different from Teachers 1, 2, and 3.

Finally, the teachers chosen for the sample were from two significantly different campuses in the district with regard to campus demographics and STAAR performance in sixth grade in order to provide insights into the intervention with teachers of different populations of students. Two of the teachers were from a high STAAR performing campus with 96% of students approaching grade level standards, 73% meeting grade level standards, and 38% mastering grade level standards compared to the district averages of 89%, 60%, and 29%, respectively. Campus demographics on this campus are also significantly different from the other campus with 53.2% White, 35.5% Hispanic, 3.2% African American, and 4.9% from two or more races. The campus has 12.1% economically disadvantaged students and 20.8% at risk.

The other three teachers were from a lower STAAR performing campus in the district with 82% of students approaching grade level standards, 43% meeting grade level standards, and 19% mastering grade level standards. Their campus demographics are comprised of 42.3% White, 48.9% Hispanic, 3.4% African American, and 3.7% from two or more races. The campus

has significantly higher economically disadvantaged and at-risk populations at 42.7% and 43.2%, respectively.

Proposed Research Paradigm

The pragmatist paradigm is used as a basis for this mixed methods study because it seeks to provide direction to a real-world problem by addressing it in a realistic and practical way (Patton, 2015). Patton (2015) posits that the pragmatist paradigm informs qualitative inquiry in two ways: "First is inquiring into practical questions in search of useful and actionable answers. Second is making pragmatic decisions while conducting the inquiry based on real-world constraints of limited time and resources" (p. 153). Morgan (2014) further emphasizes that results in a pragmatist paradigm are judged based on the original purpose and goal of the research, which in this study are wholly meant to benefit students using SIDU and to benefit teachers in their reasons for using SIDU in their classrooms.

Data Collection Methods

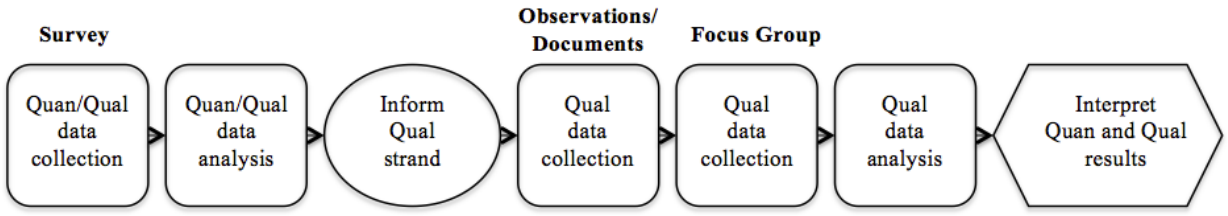
This mixed methods study was first approved by the school district superintendent and then was submitted to the IRB on February 5, 2018 in order to obtain approval for collecting data from human subjects. Approval by the IRB was obtained on February 22, 2018 (Appendix E), followed by an approval for continuing review of the research on January 7, 2019 (Appendix F). All data was collected from secondary math teachers on campuses within the school district.

A mixed methods design was chosen for this study for the purpose of development, where "one method is implemented first, and the results are used to help select the sample, develop the instrument, or inform the analysis of the other method" (Green, Caracelli, & Graham, 1989, p.267). The design's intent is also to address practical issues within secondary math classrooms in the district and does not seek to generalize to a larger population. While both

quantitative and qualitative data were collected and analyzed first, the data was used to supplement and inform the qualitative data in the study (Ivankova, 2015).

In this sequential mixed methods study (Figure 3.2), within-strategy mixed methods data was collected in a survey collecting both qualitative and quantitative data (Ivankova, 2015). The data were initially used to better understand current practices and teacher reasons for using SIDU along with identifying the need for a SIDU intervention that would better align with research-based practices and the goals for which teachers identified for using SIDU. During implementation and use of the SIDU intervention with the sample teacher group, classroom observations were conducted to gather qualitative data and study the use of the intervention in the natural classroom setting. During the observations, sample SIDU documents were also collected for analysis to further illuminate use of the SIDU intervention in the classroom. At the conclusion of the SIDU intervention, a focus group was conducted with the sample teacher group to discuss use of the intervention and to frame the work for future use and modification.

Figure 3.2: Research Design



Data Sources and Analysis

The initial phase of the study was a cross-sectional survey designed specifically for the research in this study. Cross-sectional surveys collect data about a population at a given point in time and are used to describe characteristics within a group (Desimone & Le Floch, 2004).

Ready access to math teachers in the district allowed for a survey of participants who were similar in the characteristic of use of SIDU in their classrooms, but who differed in the reasons why they used the practice. The design of the survey was to have respondents answer whether they used SIDU practices, and then from those who did use these practices, inquire as to the reasons why to understand the differences in their use and the reasons why they used SIDU. Cross-sectional surveys are also beneficial for supporting research by gathering preliminary data about a situation (Cherry, 2018). In this way, the survey was also used to have a better understanding of current SIDU practices in math classes in the district and to guide further research. Understanding the extent to which teachers were implementing SIDU practices and what their motivations were for using SIDU was critical in establishing a need for the intervention and for use in the design of an intervention that would meet both students' and teachers' needs.

Because I intended to send the actual survey to an entire math teacher group in the district, I piloted the survey with a group of five math specialists and math instructional coaches in the district to elicit feedback for modifications for the actual survey and to ensure ease of completion of the survey by teachers. Cognitive interviews (Desimone, 2004) were used with individual members of the pilot group where they were asked to talk through their thought process as they answered the questions on the survey. This feedback was used to make minor modifications to the initial survey instrument for clarity.

With ready access to the population, I designed a single-stage sample utilizing email contacts of teachers for the survey. Stratification of the population was used for the survey sample based on math teachers' grade level assignments and only sixth, seventh, eighth math, and algebra I teachers were chosen (Creswell, 2014). The sample included the selected grade

level math teachers in the district for two reasons: 1) because of the state STAAR exam, teachers in these grades tend to employ various uses of data and are more familiar with the use of data use in instruction and learning, and 2) because I work with secondary math teachers, I have more frequent interactions with teachers from these secondary grades due to state testing requirements. I also chose the sample due to convenience and availability to the sample group (Creswell, 2014).

I created the voluntary, anonymous survey using an online survey tool. This type of survey was chosen because it is low cost, fast, and efficient (Sue & Ritter, 2016). Survey Monkey was chosen as the online survey tool because it allows for creation of a survey that permits for anonymous collection of responses and keeps those responses secure. It also collects and presents the data in various forms for further analysis.

The link to the online survey was sent through district email to the sample population of 53 teachers in the spring of 2018. One reminder email was sent a week after the initial email to recipients for those who intended to complete the survey but had not had time to complete it. Recipients were informed that the survey was voluntary, confidential, and anonymous. The approximate length of time it would take to complete the survey, the purpose for the research, and how the data would be used was also shared (Appendix G).

Because data was needed to understand the extent to which teachers were using SIDU in the classroom, along with how and why they were using it, a short, six-question survey was created in order to establish criterion for the research and creation of the SIDU intervention. The survey was sent to 53 teachers in the population of sixth, seventh, eighth, and algebra I math teachers in the district. The survey combined fixed-choice quantitative questions soliciting information about teacher demographics and information regarding how students tracked their

own data with open-ended qualitative questions soliciting how teachers discussed data with their students and the reasons why they had students track their own data (Table 3.2).

Table 3.2: SIDU Survey Questions

Survey Questions
1. What math courses from the list below do you teach? 2. How long have you been teaching? 3. Do students track their own data in your classroom? 4. In what ways do students track their own data? 5. Do you discuss the data a student has tracked with the student? If yes, please explain. 6. Explain the reason(s) you have students track their own data.

The first two questions were used to identify math courses teachers taught along with the length of time they had been teaching. Not only were these two questions used as a means for teachers to become familiar with the online survey platform, but they were also used to identify any trends in data between courses and years of teacher experience with regard to use of SIDU practices. Question three was a yes or no response and was created as a skip-logic question where teachers answering no exited the test, and teachers answering yes, continued to answer the remaining questions. Question four was used to establish the types of data teachers had students track in their classrooms from a list of previously observed SIDU classroom practices (Table 3.3). This list was generated from my observations in classrooms and from SIDU documents I had previously observed teachers using in their classrooms. Teachers were also allowed to describe other ways not listed by selecting “other” and providing a brief description

Table 3.3: Survey Question 4 Question and Answer Choices

Question 4: Which types of data do your students track for themselves? Check all that apply.
Answer Choices
• Grades on warm-ups • Grades on daily assignments or homework • Grades on quizzes • Grades on tests • Texas Essential Knowledge and Skills (TEKS) on tests • Texas Essential Knowledge and Skills (TEKS) on warm-ups, homework, or assignments • Specific math skills such as multiplying fractions or solving equations • Completion of online learning lessons • Other (please specify)

Question five was also a yes or no response question in order to gather data regarding whether teachers provided feedback to students when tracking data. For teachers who answered yes, they were invited to explain further. The last question, question six, was the only open-ended response question in the survey not tied to a yes or no response. In knowing that teacher time is valuable and limited, I purposefully created the survey with only one purely open-ended response question. The question stated: Explain the reason(s) you have students track their own data. Because this was not observable in my previous classroom interactions with teachers and on the documents I had observed in use, I wanted to elicit descriptive answers to this question to inform the creation of the intervention, as well as to have an understanding of why teachers employed SIDU practices with students.

Both descriptive statistical analysis and content analysis were used to analyze the survey. Descriptive statistical analysis was used to interpret and summarize quantitative data in order to identify patterns and trends and to reveal connections between variables (Ivankova, 2015). The

use of descriptive statistical analysis was chosen for analysis of the survey because it: 1) plays a supplemental role to the action research study, 2) is an effective means for presenting information about an identified problem, 3) provides initial evaluation of the issue and describes the needs identified by the teachers in the survey, and 4) is useful for informing the development of an intervention in order to address a problem (Ivankova, 2015). Content analysis was used for analyzing the qualitative data from the survey in order to provide meaning to the issue being studied (Patton, 2015).

The second phase of the study involves a minimum of two observations in each of the sample teachers' classrooms during use of the SIDU with formative assessments intervention to observe and record "…events, situations, behaviors, and interactions of people in natural settings to explore individuals' experiences with the studied issue" (Ivankova, 2015, p. 203). As an inside member of the math community who frequently observes and participates in classrooms, my role in the observations for this study are as a participant observer to gather information as an insider. As math coordinator, I am frequently in classrooms to observe teachers and students interacting during lessons. As part of my observations, I frequently have conversations or ask questions of both teachers and students as they are working. With permission, I also sometimes take pictures of student work or displays on the walls in classrooms to "tweet" out and share in the district to highlight student and teacher work, so both teachers and students are accustomed to my presence in classrooms.

The purpose of the observations are to gather data during the SIDU intervention as it naturally occurs in classrooms in order to reveal specific aspects of how it is used by teachers and students and to study the practicality and effectiveness of the intervention. This information will be used to guide improvements and modifications in the future (Ivankova, 2015).

Prior to beginning observations, I met with the selected teachers to solicit their involvement in the study and to inform them of the overall intent of the study, and the methods used for data collection in the study. At this time, the Informed Document (Appendix H) was shared with teachers to sign and participants were informed of their rights and were assured of confidentiality and anonymity. Participants were also informed of the dates and times for the observations. The observations took place during the weeks of February 11th, 2019 through March 1st, 2019, which encompassed one unit of study for students. Teachers were asked to do the intervention with one class period and shared those class times with me for observations. During the observation, in-depth field notes were taken using an observational protocol to record information. The observation protocol included the following:

- A description of the classroom setting
- Activities that take place within the classroom
- The participants and their interactions with each other
- Direct quotes and comments of participants
- The observer's personal meanings of what is observed in the classroom including reactions, insights, reflections, interpretations, and significances of what is observed

Field notes also included the date and place of the observation, the number of students and teachers present for the observation, and the math grade level or course for the observation.

An inductive analysis of the observation field notes will be conducted to identify categories and themes across classrooms (Ivankova, 2015). Analysis will be conducted in a step-by-step manner beginning with collected data organization, immersion, synthesis, manual coding, and then followed by an analysis and interpretation of the data (Ivankova, 2015). Data analysis will take place iteratively where analysis will occur as soon as is practical after data collection and future observations and analysis will continue to occur adding to the existing data and analyses (Creswell, 2012). Careful consideration will be given to the findings with regard to the initial survey and to the existing research and theories discussed in this study.

Because the SIDU intervention involves use of a document for students to track and analyze data, sample documents will also be collected at the conclusion of the unit and the observations. Creswell (2014) cites several advantages to collecting documents in qualitative studies including convenience for the researcher and also as a means for unobtrusively gathering information that includes the "language and words" of participants (p. 191). As part of the data collected by students, they were asked to write written reflections on learning and these reflections help illuminate the various ways students analyze and reflect on their own data. These documents will not be formally analyzed as part of the study, but will be gathered as a means to provide examples to illuminate specific aspects of the SIDU intervention. Teachers will be asked to collect representative documents, without identifying information.

The final phase of the study involves a semi-structured focus group interview with teachers participating in the SIDU intervention, while I act as the moderator of the discussion. The main purpose for use of a focus group is to explore the applicability and practicality of the intervention and to inform modifications for future use (Ivankova, 2015). A focus group was also chosen in order to conveniently interview teacher participants using the intervention, while also allowing for teachers to interact and consider the views of others, respond to the comments and ideas of those in the group, and to highlight differing perspectives when using the intervention (Patton, 2015). Creswell (2007) identifies:

> Focus groups are advantageous when the interaction among interviewees will likely yield the best information, when interviewees are similar and cooperative with each other, when time to collect information is limited, and when individuals interviewed one-on-one may be hesitant to provide information (p. 133).

The face-to-face interviews occurred the week after the completion of the intervention so that ideas and opinions would be fresh in teachers' minds. The focus group met at an agreed upon location on March 5, 2019 from 4:45 p.m. to 6:15 p.m. and consisted of all five members of the

SIDU intervention teacher sample. My role as moderator was to use the ten questions on the Focus Group Guide (Appendix I) to guide the discussion. Questions were open-ended in order to elicit participants' personal views and opinions regarding the SIDU intervention and to allow participant reflection without influence from the researcher (Creswell, 2007).

Prior to the interview, consent and confidentiality were reviewed with participants. During the focus group interview, detailed handwritten notes were transcribed regarding answers and comments from teachers in the focus group. Transcribing involved a combination of summarized comments as well as verbatim statements from participants. During the interview, special attention was given to how participants discussed the topic in order to better understand any particular emotions or feelings about the intervention (Patton, 2015).

Inductive analysis of the focus group interview will begin immediately after the focus group to capture the researchers' initial reactions, insights, reflections, and interpretations of the focus group interview. Further analysis will specifically look for connections to previously identified themes from classroom observations as well as to inductively identify new patterns and themes from the focus group interview.

Timeline of Study

After obtaining approval from the district Superintendent and the Institutional Review Board (IRB), data collection began in the spring of 2018 and was completed in the spring of 2019. Analysis of the survey occurred during the summer and fall of 2018 and was used to inform the intervention, while analysis of the observations and focus group occurred in the spring of 2019 (Table 3.4).

The survey was sent to teachers by email on April 17, 2018 in order to provide ample time for data analysis and reflection on the subsequent creation of the intervention. Summer

months and beginning of the school year are extremely busy as a math coordinator, and I felt I needed to commit enough time to research and study the problem in greater depth. This time was also optimal because middle school math teachers had completed STAAR testing and algebra I teachers had completed teaching their units of study and were in the process of reviewing for STAAR. I felt that this time frame would provide me with a better percentage of responses than if the survey had been sent during busy instructional times during the year. One reminder email was sent a week later for teachers who may have intended to complete the survey but had not done so at that time. Analysis of the survey occurred during the months of June and July 2018 in order to provide sufficient time to begin researching the themes in the survey and how these could be integrated into the creation of the SIDU intervention.

Table 3.4: Timeline of Study

Data Source	Data Collection	Data Analysis
Survey	April 17, 2018 – May 7, 2018	June 9, 2018 – July 31, 2018
Observations and Document Collection	February 13, 2019 – March 1, 2019	February 14, 2019 – April 20, 2019
Focus Group	March 5, 2019	March 6, 2019 – April 20, 2019

Observations were conducted during the weeks of February 13, 2019 – March 1, 2019. This was the timeframe for one unit of study in sixth grade. This allowed for beginning the intervention at the start of a unit and gathering data during the use of the intervention during the unit of study. The focus group was conducted immediately after the use of the intervention on

March 5, 2019 so that teachers would have recent recollection of using the intervention in order to provide more thorough and specific data. Additionally, spring break was scheduled for the following week and gathering this data prior to the holiday week was optimal. While data analysis began soon after the first classroom observation on February 14, 2019 to begin to identify patterns and themes, the complete set of qualitative data occurred after completion of the focus group interview from March 6, 2019 to April 20, 2019.

Reliability and Validity Concerns or Equivalents

The intent of this study is not to generalize to a larger population but to explore current use of SIDU in localized classrooms and to begin an exploration of using SIDU in ways that are more beneficial for student learning and for teachers' reasons for using SIDU practices in secondary math at the district level. Because the initial survey gathered information on current SIDU practices at a given point in time and for teachers in secondary math STAAR tested grade levels only, the survey instrument has both validity and reliability constraints. To mitigate these constraints, the instrument was sent to all teachers in the district in math STAAR tested grade levels and included one reminder in order to capture as much data as possible. Teachers were also informed that the survey was voluntary and anonymous in order to ensure that teachers would know that I, as the district math coordinator, would not know if they participated or have any knowledge of their individual responses. Additionally, in knowing that teachers' time is limited and in order to elicit a fair amount of responses to the survey, only 6 questions were included on the survey with one purely open-ended response question. Content validity of the survey has restraints as well and was addressed with regard to the questions on the survey by eliciting feedback on the questions from five district level colleagues who have familiarity with SIDU practices in the district.

The qualitative data on the observations and focus group were assessed with regard to trustworthiness, which Lincoln and Guba (1985) suggest are better measures for assessing the findings in qualitative studies. Trustworthiness includes credibility, transferability, dependability, and confirmability (Ivankova, 2015). While the trustworthiness in this study is significantly limited due to time constraints and availability to a larger population, various actions were taken to contribute to its trustworthiness. These include: 1) credibility, dependability, and confirmability with regard to using participants with varying experiences and in using different sites with different demographics, 2) transferability with regard to the descriptive information gathered in the observations in that they could to be compared with other contexts, 3) dependability and confirmability with regard to documenting evidence of the data collection procedures, analysis and interpretations, and 4) confirmability with regard to clarifying the researcher's particular biases and assumptions regarding the study and the SIDU intervention.

Finally, when exploring concerns of reliability and validity through a pragmatist perspective, the major focus of this study is to affect change and actual use of SIDU practices in the district. Patton (2015) reminds us "Since no study can be value-free, utilization-focused inquiry answers the question of whose values will frame the study by working with clearly identified, primary intended users who have the responsibility to apply findings and take action" (p. 696).

Closing Thoughts on Chapter III

The methods used in this study were chosen to inform actionable results. In my observations and discussions with teachers, SIDU practices in secondary math in the district varied widely. Not only did I question the practice of tracking grades as being beneficial for

student learning, but I also wondered what teachers' primary motivations were for using this practice.

My observations prior to the study led me to believe that over half of the teachers in STAAR tested math grade levels used the practice, but there was no consistency in use among teachers. In order to provide teachers a useful alternative that might be more beneficial to students, I chose to do a baseline survey to understand the current ways SIDU was being used in secondary math classrooms in the district, and then use this information to create an intervention based on what would be a better context for students in using SIDU to promote learning, but at the same time align with the reasons why teachers used SIDU. Observing the SIDU intervention in use in the classroom was necessary in order to identify particular patterns and themes across classrooms with actual use of the intervention. These observations also involved collection of SIDU intervention documents to provide further insights into its use. Finally, a focus group to gather teachers' feedback on the intervention was necessary to understand the strengths and limitations of the intervention from their perspectives and to inform modifications to its use.

CHAPTER IV

ANALYSIS AND RESULTS

The purpose of this research study is to answer the following questions:

1. How, why and to what extent are the district's sixth, seventh, eighth, and algebra I math teachers currently using student-involved data in their classrooms?
2. What interactions are observed in classrooms implementing a student-involved data use intervention using formative assessments?
3. What benefits, limitations, and modifications do teachers identify for future use of student-involved data use using formative assessments?

To understand how secondary STAAR grade level math teachers were currently using SIDU in their classrooms in the district, a survey was sent to all 53 secondary math STAAR tested grade level teachers. The data gathered was also needed to inform the initial creation of a SIDU intervention document and plan. The intervention plan created was intended to be an initial attempt at having teachers use SIDU practices incorporating formative assessments rather than unit test data. The intervention was not created with the intent of gathering data on a final document or intervention, but rather was created in order to study and use to elicit feedback and make collaborative adjustments. During use of the SIDU intervention, classroom observations were conducted and SIDU documents were collected in order to answer question two regarding interactions observed during the SIDU intervention. Finally, a focus group interview with the teachers in the classrooms using the SIDU intervention was conducted to answer question three defining the benefits, limitations, and modifications of the intervention.

Presentation of Data

Research Question 1

How, why and to what extent are the district's sixth, seventh, eighth, and algebra I math teachers currently using student-involved data in their classrooms?

A survey was chosen to answer research question one because it is a useful tool for gathering information about an issue and showing trends in stakeholder opinions (Ivankova, 2015). The survey consisted of both quantitative and qualitative data; therefore, analysis includes both descriptive statistical analysis and content analysis. Descriptive statistics is useful in presenting initial information about an issue and for informing the development of an intervention to address an issue (Ivankova, 2015), while content analysis helps in providing meaning to the issue (Patton, 2015).

To answer research question one, a six-question mixed methods survey was sent via email to the entire population of 53 secondary math teachers in the district who teach sixth through eights grade math and algebra I. The link to the online survey was sent through district email to teachers on April 17, 2018, and was followed up by a reminder email sent one week later on April 24, 2018. The purpose for the research and how the data would be used was shared with email recipients. Recipients were also informed that the survey was voluntary, confidential, and anonymous and were informed of the approximate length of time it would take them to complete the survey (Appendix G). From the 53 teachers sent the survey, 36 teachers responded.

The first two questions were to familiarize respondents with the survey platform and to obtain a general makeup of the teacher group regarding the grade levels taught and the years of teaching experience represented in the group. These questions were:

- What math courses from the list below do you teach?
- How long have you been teaching?

On question one, teachers were able to select multiple courses if they taught more than one grade level or course. The makeup of math courses taught by the group is shown in Table 4.1.

Table 4.1: Math Courses Taught by Teacher Survey Respondents

Math Course	**Number of Teachers per Course**
6th Grade Math	19%
PreAP 6th Grade Math	13%
7th Grade Math	25%
PreAP 7th Grade Math	22%
8th Grade Math	25%
Algebra I	28%
PreAP Algebra I	13%
Number of Teachers Responding	36

Note: Teachers were able to select multiple courses, so the percentage adds to more than 100%.

From question two, slightly more than half of the teachers had from zero to ten years of teaching experience with the remainder of the teachers having 11 or more years of experience. The years of teaching experience in the survey group is shown in Table 4.2.

Table 4.2: Years of Teaching Experience per Surveyed Teachers

Years of Teaching Experience	Number of Teachers
0 – 2 years	11%
3 – 5 years	25%
6 – 10 years	17%
11 – 20 years	36%
21+ years	11%
Number of Teachers Responding	36

While the first two questions were to obtain a general makeup of the teacher group, the remainder of the survey questions sought to identify and describe the current contexts for the use of SIDU in secondary math classroom.

The first of the remaining questions was asked in order to identify the number of teachers who currently had students track their own data in their classes in some way. The question asked the following: Do students track their own data in your classroom? From the 36 teachers initially responding, 35 responded to this question. Approximately two-thirds of teachers answered "yes" that they had students track their own data. Those responding yes were then asked to complete the remaining questions, while the teachers responding "no" exited the survey.

The next question sought to identify the specific types of data teachers asked students to track in their classrooms; 26 responded to this question. Teachers were given descriptions of eight types of data collected by students. The types of data listed were based on tracking previously observed in classrooms or were types of data that teachers shared regarding student data tracking. Survey respondents were able to select one or more of the various types of data they asked students to track. A final selection was open-ended and labeled "Other: Please

Specify." Teachers were able to select this option if they did not find a descriptor in the list of how they had students track data. Data from the survey is shown in Table 4.3.

Table 4.3: Types of Data Students Track in Classroom

Data Types	**Number of Teachers Tracking this Data Type**	**Percentage of Teachers Tracking this Data Type**
Grades on warm-ups	5	19%
Grades on daily assignments or homework	6	23%
Grades on quizzes	8	31%
Grades on tests	20	77%
Texas Essential Knowledge and Skills (TEKS) on tests	14	54%
Texas Essential Knowledge and Skills on warm-ups, homework, or assignments	6	23%
Specific math skills such as multiplying fractions or solving equations	5	19%
Completion of online learning lessons	5	19%
Number of Teachers Responding	26	

Note: Respondents were able to select multiple types of data students tracked in their classrooms, so the percentage adds to more than 100%. One respondent chose other, but indicated TEKS on tests, so this data was included in the corresponding category above.

The majority of data teachers asked students to track were on tests, and over three-fourths of teachers asked students to track this data. Additionally, several teachers asked students to track grades on other classroom assignments such as warm-ups, homework, or quizzes. When SIDU involved tracking data on the math learning standards, more than half of teachers

identified that these were tracked on unit tests. Only six teachers identified that TEKS were tracked from classroom tasks occurring during the learning process such as warm-ups, homework, or quizzes.

While the first four questions collecting quantitative data were analyzed using descriptive statistical analysis, the two remaining questions, consisting of qualitative data, were analyzed using content analysis. In the first of these questions, teachers' responses were grouped into similar categories and tallied for the number of occurrences. In the final question, teachers were asked to explain the reasons they had students track data. The responses were first subdivided into the categories of student benefits and teacher benefits, and then further subdivided into categories of specific reasons. Most teachers gave multiple reasons for asking students to track data, so the categories of reasons were tallied to identify the number of times each reason was referenced.

Question five on the survey asked teachers to answer yes or no regarding whether they discuss the tracked data with their students, and was followed by asking teachers answering yes to explain further. On question five, 23 teachers responded that they did discuss data with their students, and 19 provided further explanations. The data was analyzed by dividing responses into similar categories and using frequency counts of responses in these categories as shown in Table 4.4.

Table 4.4: Ways Teachers Discuss Data with their Students

Teacher/Student Data Discussions	Number of Times Cited
Discuss students' strengths and/or weaknesses with student	65%
Set goals with student	30%
Discuss improvements with student	30%
Encourage student focus on growth	13%
Relate data to STAAR test for student	13%
Use strengths to build confidence	13%
Create intervention plan with student	4%
Number of Teachers Responding	23

Note: Respondents were able to describe multiple ways they discussed data with Students, so the percentage adds to more than 100%.

Teachers described various ways in which they discuss data with students. In 15 of the 19 explanations, teachers referred to discussing strengths and weaknesses with students; two of these included using strengths to build student confidence. One teacher describes, "We talk about the strengths and weaknesses. I like to focus on the strengths to build confidence in students." Another teacher notes:

> I discuss students' data results including gaps and areas of weaknesses and strengths with those students who are at an academically mature level so that they benefit from the information. These students can then take the information and find resources to help them be more confident and competent in the skill. This usually happens in the form of a student/teacher conference.

Two other factors cited frequently by teachers were discussing data with the student in order to set goals or to make improvements. One teacher noted, "When looking at test data, we talk about their goal and whether or not they meet it each test, such as growing on each test or getting a certain number correct." Finally, three teachers cited discussing data with students as it relates to

the STAAR assessment. One teacher discussed the specific strategies used to encourage improvements in the levels of mastery that are measured on STAAR:

> The students and I talk about what TEKS they struggled with and what TEKS they did well on. I also started posting on the board the levels of mastery (approaches, meets, masters). The students really like to see this because it lets them know where exactly they fall amongst other 7th grades. Are they one or two questions away from reaching the next level? Then we discuss what ways we can get to the next level of mastery.

The final survey question was an open-ended response question asking teachers to explain the reasons they have students track their own data: 25 teachers responded to this question. Teachers cited many reasons for having students track their own data. Reasons were mostly stated in terms of student benefits, while a few responses identified teacher benefits. Data was divided into the two broad categories of teacher and student benefits and was then further analyzed by dividing specific responses into smaller, similar categories as depicted in Table 4.5.

The two most cited reasons for asking students to track data were for students to take ownership of their own learning and/or for students to have an awareness of their strengths and weaknesses; six teachers cited both of these reasons. Teachers also frequently stated that it allowed for students to be able to see their progress or improvement in learning and was a tool to use to set goals. One teacher notes, "If they know their strengths and weaknesses, they own some of the responsibility in their learning. They also know what they can do to better themselves." Another teacher states:

> Students need to be aware of their progress. Having them track their own data puts the ownership on the student and not just the teacher. Students care about their progress. Goal setting is just as important. They like hearing that you believe in them, and see the success or mastery of a concept. You can then easily push/ motivate them by instilling this trust, encouragement, and pride in them. It is truly remarkable.

Two teachers cited the ability for students to see the data in relationship to STAAR. One teacher states:

> So they (students) can take ownership of it. They also have more ahhh-haaa moments about what they are doing when I explain the data more in detail. Especially the fact that passing on STAAR is 40-50% but passing in my class is 70%. Seeing that they would pass STAAR is powerful to know.

A few teachers also connected the tracking of data to being able to share data with parents, while one response identified that having students track their own data prevented students from using "not knowing" about their progress as an excuse.

Table 4.5: Reasons Teachers ask Students to Track their own Data

Teacher Reasons for Tracking	Number of Times Cited by Teachers
Student to take ownership of own learning	52%
Student to have awareness of strengths and weaknesses	52%
Student to have a visual of their learning and progress	36%
Student to use to improve learning	28%
Student to use to set goals	20%
To motivate or encourage growth in student	20%
Student understanding of relationship to STAAR test	8%
Student ability to share data with parents	8%
Inform teacher of what needs focus in own instruction	8%
Student cannot use "unawareness" as an excuse	4%
Teacher professional goal	4%
Number of Teachers Responding	25

Note: Teachers were able to describe multiple reasons for asking students to track data, so the percentage adds to more than 100%.

Teachers also cited the reasons for asking students to track data in relation to benefits for the teacher, one of which was identifying SIDU as a teacher evaluation professional goal. The most cited reasons, though, were to help them motivate students and encourage growth. One teacher states, "It is important for my low kids to see their strengths and it is important for my high kids to see their weaknesses. This allows for continuous growth for every kid in my class." A few teachers noted the benefits for them in adjusting instruction. One teacher states, "The data also helps me focus on what TEKS need to be spiraled in entry tickets, exit tickets, homework, warm-ups, on tests and quizzes." Finally, one teacher summarizes:

> I believe that when students are just given their number grade it doesn't mean much, but having them graph it after setting a goal and seeing them reach that goal (or sometimes not) is powerful. They like to see how they did in comparison to how they thought they'd do. They generally start out setting a really high goal and not quite reach that. Toward the end of the year the gap between their goals and their scores are usually much closer in a positive direction.

Research Question 2

What interactions are observed in classrooms implementing a mastery oriented student-involved data use intervention using formative assessment?

For question two, classroom observations were conducted during the SIDU intervention, along with collecting sample SIDU tracking documents used during the intervention process. Ivankova (2015) posits that observation is "…an effective tool for testing interventions…" and "…can be used as a complementary data source and supplement other forms of data to develop a holistic and convincing view of the situation and to measure a response to action/intervention" (pp. 199-200). In addition to classroom observations, a sample of SIDU documents were collected to supplement the observation data and to provide additional insights regarding the intervention (Ivankova, 2015).

Thirteen forty-five to fifty minute classroom observations were conducted from February 13, 2019 through March 5, 2019. A purposeful sample of five-sixth grade math teachers from two demographically diverse campuses in the district was chosen for classroom observations and for student document collection. The teachers were also observed teaching varying levels of sixth grade math in order to provide a more holistic view of the intervention being used across different student groups (Table 4.6).

Table 4.6: SIDU Classroom Observations Math Courses, Campus Demographics, and STAAR Performance

Position	6th Grade Math Course for Classroom Observation	Campus Demographics	2018 6th Grade Math STAAR Performance on Grade Level Standards (GLS)
Teacher 1	Pre-Advanced Placement	• 42.3% White, 48.9% Hispanic, 3.4% African American, 3.7% Two or More Races • 42.7% Economically Disadvantaged • 43.2% At-risk	• 82% Approach GLS • 43% Meet GLS • 19% Master GLS
Teacher 2	On-level		
Teacher 3	Intervention		
Teacher 4	On-level	• 53.2% White, 35.5% Hispanic, 3.2% African American, 4.9% Two or More Races • 12.1% Economically Disadvantaged • 20.8% At-risk	• 96% Approach GLS • 73% Meet GLS • 38% Master GLS
Teacher 5	Pre-Advanced Placement		

Note: All teachers taught additional levels of 6th grade math or other grade level math courses.

Although teachers were given a SIDU guidelines document to reference, which was also reviewed with them prior to implementation, it was emphasized that the SIDU intervention and document was to be enacted in a way that made sense to them. Teachers were reminded that one of the major purposes of the SIDU intervention was to gather feedback to inform modifications to the document and the process used for SIDU tracking in the district in the future. All teachers

were observed on their first day of the SIDU intervention implementation with at least one follow-up observation during the three-week unit of study as they continued to use the intervention with students.

During the SIDU intervention observations, both student and teacher actions and comments, along with personal reflections, were transcribed in an observation notebook. The observation protocol included the date, campus, number of students, number of teachers, grade level specification of the classroom (Pre-Advanced Placement, intervention, or on-level), and a physical description of the classroom. Observations included transcribing teachers' and students' words and actions during use of the SIDU intervention. Reflections included personal insights and interpretations based on my understandings of SIDU along with my experiences of frequently observing in secondary math classrooms on a regular basis.

Inductive content analysis was utilized for analysis of the qualitative data collected from the classroom observations. Inductive analysis, as defined by Patton (2015), involves analysis of data without preset categories by working from specific cases to create common patterns and identify themes across cases. Analysis began soon after the first three classroom observations and continued through the completion of all observations. At the conclusion of the observations, transcripts were read and re-read to familiarize myself with the data and to begin to identify additional patterns and themes not previously identified after initial observations.

The analysis process began with color-coding the data from the observation field notebook into broad categories identified during the observation process; the sample of collected SIDU documents at the completion of the intervention were initially color-coded in the same way. The categories used for initial coding, which were first identified during the observation

process, were the following: integration, management, feedback, student reactions, and variations as shown in Table 4.7.

Table 4.7 Initial Codes, Descriptors, and Excerpts from Observation and Document Data

Code	Descriptor	Excerpt from Data Collection
Integration	Actions related to the integration of SIDU into classroom processes	Teacher integrates existing exit ticket practice into SIDU tracking process.
Management	Comments and actions related to SIDU document management	Teacher: "I am going to pass out the tape so we can paste it [SIDU tracking document] into your journals."
Feedback	Comments related to teacher feedback on learning or tracking during SIDU	Teacher: "You're doing great. Be sure to put parentheses if you have ordered pairs."
Student Reactions	Comments and actions of students related to SIDU	Student: "Why are there so many boxes?" (referring to the SIDU tracking document).
Variations	Actions in the way teachers enacted SIDU	Teacher displays SIDU document on the projector, models writing in NY on the SIDU document, and then shades over NY.

Note: Excerpts are representative of comments and actions collected in field notes data transcripts.

Similarly color-coded data was then examined within these initial categories and each category separately analyzed to begin looking for patterns and themes within and across these initial categories. Several themes began to emerge from this analysis and were coded accordingly. A third analysis of the data was then conducted paying close attention to not only these emerging themes, but also by analyzing the data through the lens of the literature and theories framing this study. Six codes were assigned to the emerging themes and include 1) the language of the standards, 2) growth, 3) seeing, 4) ownership of learning, 5) feedback and

6) SIDU management. Theses codes are depicted in Table 4.8, along with a descriptor and a sample excerpt to provide clarity for each code.

Table 4.8 Identified Codes, Descriptors, and Excerpts from Observations and Documents

Code	Descriptor	Excerpt from Data
The Language of the Standards	Comments related to the language used in the Texas Math Standards (TEKS)	Student: "I think that I'm good at using tables, graphs, and equations, but I'm not too good at verbal descriptions."
Growth	Comments related to growth and improvement in learning	Student: "I got an NY on 11A, but I improved and shaded over it."
Seeing	Comments related to visually seeing learning progress	Teacher: "This is tracking to see how well you understand what we are learning."
Ownership of Learning	Comments related to the ownership of learning	Student: ""I should look closely for the fractions and usually I go too fast on them so I must go slow."
Feedback	Comments related to teacher feedback on learning or tracking during SIDU	Teacher: "They wanted a lot of feedback today."
SIDU Management	Comments and actions related to the SIDU tracking process	Teacher: "Ok, open your journal. Where is the chart we taped in?"

Note: Excerpts are representative of comments and actions collected in field notes data transcripts

The Language of the Standards

Initial implementation of the SIDU intervention was fairly similar among teachers with only slight variations. On the first day of implementation, four of the five teachers began by providing students with two or three formative assessment items to answer. After students

answered the items, teachers shared the SIDU tracking document with students and explained that they would be tracking their progress on math concepts during the unit. All teachers referred to the math standards (TEKS) to be covered in the unit that were listed on the SIDU tracking document as they introduced the intervention process. One teacher referred only to the standards assessed that day, while the other four referred to all of the standards for the entire unit. One teacher also connected the standards to standards they had learned in fifth grade that were similar, while another teacher asked students what they thought specific standards meant. She asked, "What do you think independent and dependent might mean in this TEKS?" One teacher, at the conclusion of reviewing with students all of the standards to be covered in the unit, exclaimed, "Look at all the things you guys will learn in total for this unit!"

By the second observation, four of the five teachers displayed the SIDU tracking document on the projector for students to see when discussing the standards they were tracking. Teachers had also integrated other classroom activities into the tracking process and had coded the standards for these activities for ease of tracking for students. Teachers referred to the standards as they were tracking and several teachers asked students to identify what part of the standards they were assessing. Students readily responded in the language of the standards and used responses such as independent and dependent, whole numbers and integers, and verbal descriptions.

From the sample SIDU documents collected, adaptation of the use of the standards by students was also evident. When reflecting on their learning, students frequently referred to the standards, either by code number or in the specific language found in the standard. Students wrote the following reflections:

- "I need to keep working on verbal descriptions."
- "Identifying the independent/dependent is very easy to me."
- "For 11A, I got every one. It was the easiest for me and I got the highest points to shade in on the first 11A."
- "I didn't understand graphs or equations at first, but then I got to shade."
- "I'm really good at whole numbers and integers."
- "I think that I am able to keep all of 6A in my mind and not forget."

Students also appeared to be proud of their ability to identify the standards they were tracking. When one teacher asked students what part of the standard 6C they should track on the SIDU document after working on an assessment item, several students responded in unison, "verbal descriptions." In response to items that students were assessing in one class, a student asked, "What about 6A?" when she noticed that they had not solved a problem on this particular standard. The teacher responded, "We didn't assess 6A today. We will tomorrow."

Increased familiarity with the language of the TEKS, as well as the coding of the standards during the unit, by both teachers and students, was evident. Teachers and students frequently referred to the standards by code number and in their written and verbal descriptions.

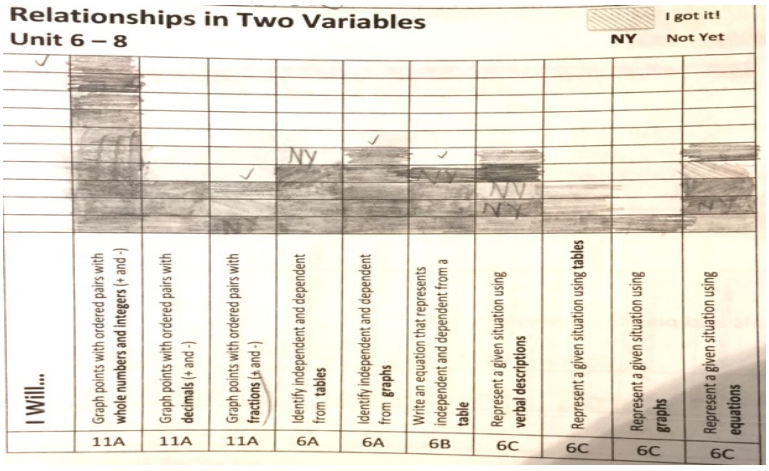
Growth

On the first day of observations, teachers either explained, or modeled, how students would complete the document by shading in cells when they correctly answered a formative assessment question and how they would enter NY in a cell for "not yet" when they had not yet gotten an assessment correct. Four of the five teachers also emphasized the importance of NY to show students that they had not yet mastered a concept, but that they would in the future. One teacher stated, "If you get a concept right, you shade it in and it goes up and up. NY doesn't

mean defeat. It means you just haven't gotten it yet, and you need to overcome a barrier." Four of the five teachers also emphasized that the NY for not yet could be shaded over the next time when getting an assessment item correct. As teachers went over the process of using the SIDU document, students asked various questions for clarification. One teacher extended the process and told students, "If I give you a thumbs up, you will shade, if I tell you not yet, you put NY for not yet. It doesn't mean you won't get it next time."

Students readily used the NY on their SIDU tracking documents, but also took the opportunity to shade over the NY when they got an assessment item correct on a following attempt (see Figure 4.1). Almost all of the documents had NYs that were shaded over, with a few remaining NYs left at the top of the columns. Students also referred to NYs in their written reflections on the SIDU document. When reflecting on TEKS 6A, one student stated, "This one at first I got NYs but then later on I got it." Another student reflected by stating, "I had a good time with 6C because I never put NY." On one SIDU document, it was apparent that a student understood the concept of NY referring to not yet and then improving, "I got NY at first, but I improved and shaded over it."

Figure 4.1: Shading and NY on the SIDU Tracking Document



Four of the teachers clearly communicated that the coding of NY on the SIDU document was indicative of not yet understanding a math concept, but that this could be changed with other attempts. All of the teachers explained to students that they could shade over the NY when they learned a concept. Similarly, students put NY in the cells corresponding to the standards they did not get correct, but shaded over them as they improved.

Seeing

On the first day of implementation in the third classroom observed, the teacher explained to the class how they would use the SIDU intervention. She proclaimed, "It's going to be awesome, because I'm going to get to see your progress, and you will get to see your progress!" During use of the intervention, teachers consistently referred to "seeing" how students were doing.

In one observation, the teacher provided formative assessment questions on math standard 6.6C – represent a given situation using verbal descriptions, tables, graphs, and equations. On the SIDU tracking document, this standard is divided into four columns to track so that students can distinguish between being able to represent a math situation in various forms. One of the teachers explained, "We are going to track all four of the 6Cs and see how we are doing. You'll see which part of the TEKS you might be struggling with." As one teacher was observing students' SIDU tracking, she exclaimed, "I like what I see, shade it in!"

The theme of "seeing" appeared in more subtle ways on the SIDU tracking document and was mostly evident in the way students referred to the way their graphs appeared to them. One student noted, "I got a lot of NYs on this one at first, but then I noticed that I started shading it more." Another student reflected, "I have the most shading on independent and dependent. I am really good at that." Finally, one student reflected on her ability to graph points and wrote, "This

was very easy and every time I shaded in and saw it go up, I felt good about my abilities in math."

Ownership of Learning

Analysis of SIDU tracking documents revealed student ownership of their own learning during the unit. Students tracked their data, reflected on their understanding of specific learning standards or parts of standards, and finally reflected on ways they could improve in their overall learning for the unit. Some reflections on the SIDU documents were:

- "I'm really good at graphing points with ordered pairs with whole numbers & integers (+ and -) (11A). I need to work on graphing points with ordered pairs with fractions."
- "Graphing points was the easiest for me."
- "I need to work on writing an equation that represents independent and dependent from a table."
- "Finding the independent and dependent is very easy for me."
- "I need to work on 6C. I feel that I know how to, but sometimes I mix it up with other things."

Students also identified ways they could improve in their overall learning for the unit. Some reflections were:

- "I want to focus on the problem and not make silly mistakes."
- "I need to ask more questions on what I don't understand."
- "I need to come to tutoring when I need help."
- "My goal is to continue to make time to study, and ask for help when needed."

Feedback

Teachers' actions were consistent with providing feedback during the SIDU intervention. They consistently interacted with students as a whole group and with specific students when circulating throughout the room. Teachers would pause and quietly discuss student work or their tracking as students were involved in the SIDU process. One teacher asked, "How do you know that that this is the correct equation?" Another quietly told a student, "Double check your x-coordinate. Are you sure that's correct?" Two of the teachers integrated peer feedback by partnering students up during the SIDU intervention. One of the teachers said, "Talk to your shoulder buddy to see if you got the right answer, then we will discuss it in 30 seconds."

Teachers provided feedback to students on specific formative assessment items and on their tracking progress. Both general and specific feedback to students was given on the formative assessment items such as:

- "Nice job!"
- "Explain why you think that is the independent variable."
- "I don't agree. Try to graph Point P and see if you can do that one."

Teachers also provided feedback to students on the SIDU tracking process by encouraging students when they shaded in boxes on their documents. One teacher exclaimed, "That's right. Go ahead and shade that in!"

SIDU Management

On the first day of the SIDU intervention, teachers were mostly concerned with explaining the SIDU tracking process and with the management of the document; students were mostly concerned with how to use the SIDU tracking document and with where to store it. Students were inquisitive about the process and asked questions such as, "Why are there so many

boxes?" and "What does the 'I will' mean?" At first, management of the SIDU tracking document seemed cumbersome and varied among teachers. One teacher collected the SIDU tracking documents and stated that she would return them each time students tracked their progress. She shared with me that she was worried that students would lose the tracker. Three of the teachers had students store the SIDU tracking document in their interactive math journals. Two had students tape the tracking document into the journal matching the unit, while the third teacher had students keep it in a front pocket. One teacher had students use the three-hole-punch to punch holes in the document and then store it in students' math binders. Students also seemed somewhat concerned with what to do with the document. Overheard were questions such as, "So do we put this tracker beside this in our notebook?" and "Do we fold it [tracker]?" Overall, though, students seemed to be positive about the SIDU tracking process. On the first day, one student asked, "Can we shade for fun?" while another student commented, "That was fun!" after tracking.

By the second observation, it appeared that both teachers and students were comfortable with the SIDU intervention. Not only did teachers appear to be more comfortable with the process and use of the document, but students also seemed to understand the tracking process and were adept at locating and storing their SIDU document. Teachers had also integrated the SIDU intervention into their existing classroom practices more than I had anticipated. The two teachers integrating it into exit tickets when I first observed had also integrated it into having students track their progress on homework problems. Another teacher integrated it into a matching puzzle activity students completed in class. The other two teachers, who had not integrated it into existing practices on my first observation, were still doing the SIDU tracking

separate from warm-up problems, but had integrated it into having students track their progress on their problems from a quiz.

Four of the teachers had also adjusted their processes by coding the standards on other assignments they used for tracking to make it easier for students to identify for tracking. Finally, in one class, as students were beginning work on their first math assessment item, a student reminded and prompted the teacher about the SIDU intervention tracking by asking, "Do we get our charts out of our journal pockets?" To this, the teacher responded, "Yes, let's track this!"

Research Question 3

What benefits, limitations, and modifications do teachers identify for future use of mastery oriented student-involved data use using formative assessment?

To answer question three, a one and a half hour focus group interview was conducted with the five teachers using the SIDU intervention in their classrooms. The main purpose for the focus group was to explore the practical application of the intervention and to inform modifications for future use (Ivankova, 2015). A Focus Group Guide (Appendix I) was created to guide the open-ended questions for the interview. During the interview, notes were transcribed with both verbatim and summarized answers and comments from participants.

In order to capture initial reflections and interpretations of the focus group interview, personal reflections were recorded immediately after the interview. Because the research question seeks to identify benefits, limitations, and modifications, analysis began first with color-coding the focus group notes into these three areas. The data was then further analyzed for any connections to the previously identified themes from the classroom observations and SIDU documents.

Teachers identified both benefits and limitations to the SIDU intervention for students and themselves as shown in Table 4.9. While teachers identified limitations of the SIDU intervention, they generally related to procedural issues rather than limitations impacting student learning. One limitation that was fully anticipated teachers would identify was the impact on instructional time. However, teachers agreed that they really did not experience loss in class time once students became comfortable with tracking their data, except in relation to the written reflections on the SIDU document. Not only was this an impact on time, but teachers also felt that the student reflections were fairly low quality. They also felt that student reflections could realistically only be completed periodically. One teacher also admitted that she could possibly see abandoning the practice later in the year as time does become more limited when preparing for STAAR. Teachers also identified a few other limitations such as the inability for students to see their grades and know when they are failing. Another teacher wondered whether it would be beneficial to students in all grades, or just in sixth grade where students were still more willing to please their teachers.

Other than a few issues with the tracking process and management of the tracking document, especially in the beginning, teachers identified many benefits to students. They felt that students liked the tracking process overall and were able to visually see their learning progress and identify their strengths and weaknesses. One teacher said, “My students really got into it!” Teachers also felt that students had a better understanding of what they were learning and they felt it benefitted both their low and high achieving students.

Table 4.9: Benefits and Limitations of the SIDU intervention for Students and Teachers

SIDU Intervention Focus Group		
	Benefits	**Limitations**
For Students	• better understanding of what they were learning • able to identify the math standards they were learning • liked the shading process and being able to shade over NY • able to identify strengths and weaknesses in learning • liked the process of tracking • allows students to visually see their learning progress • provides opportunity for goal setting • able to compare learning to the unit test • good for both low and high achieving students • good for students to use in peer to peer discussions	• overwhelming to some students in the beginning • a few students lost the SIDU tracking document • doesn't allow for monitoring of grades
For Teachers	• able to see when students struggled in order to know when to re-teach • like seeing student growth on math standards • informed of what students struggle with in content • able to see which standards I may be assessing too much and which I need to assess • informed of which students need help • no loss of class time as anticipated • made learning a team effort	• unsure if it would benefit upper grade levels • some student writing reflections were low quality • time needed for writing reflections • sustaining throughout the year due to time constraints for STAAR • some students would not track

The teachers also saw benefits for themselves in being able to see student growth and when and what content students struggled with. One teacher noted, "I used it as they were tracking to inform me." It also helped teachers to identify specific students who needed extra help in their classes during the learning process rather than after the unit test. Two of the teachers, who have fully embraced frequent peer-to-peer discussion this year, found that it also

contributed to students' peer-to-peer discussions. One of the teachers commented, "When they see each others' charts, they learn to encourage each other through the process." One teacher reflected, "I didn't expect students to like the tracking, but they like seeing that they're doing well with graphing their progress."

Teachers also identified modifications for future use of the SIDU intervention process and to the document used for SIDU tracking (Table 4.10). The major modifications suggested to the process were to integrate reflections only periodically, such as once a week, and allow for reflections to be written or verbal. This would enable teachers to make decisions for how they wanted students to reflect on their learning and differentiate for their students. Teachers commented on the time involved to create the SIDU documents for each unit and in finding resources for formative assessments if they were to use the SIDU intervention in their classrooms in the future. They all agreed that having these resources provided would make implementation and use more feasible.

For modifications to the SIDU document, all teachers liked the ability for students to shade and enter NY on the document because it not only allowed students to visually see their progress by math standard, but it also allowed for the teachers to communicate that NY meant not yet, and that NY could be shaded over. They also liked the learning standards broken out into specific pieces and for students to be able to read and see each piece of the standard, such as in standard 6.11A which states: 1) graphing points with whole numbers and integers, 2) graphing points with decimals, and 3) graphing points with fractions. Teachers also wanted reflections to be broken out by specific pieces of the math standards to match the tracking section. Other suggested modifications included color coding the readiness and supporting standards and

creating the graph horizontally rather than vertically so that students could easily read the language of the standards.

Table 4.10: SIDU Intervention Modifications to the SIDU Process and Document

SIDU Intervention Modifications	
To SIDU Process	**To SIDU Document**
• Start at the beginning of the year • Start with 6th grade, then move up grade levels each year • Do reflections periodically such as one time per week, not every day • Make reflections either written or verbal to accommodate high and low achieving students • Break reflections into specific pieces of math standards to match data tracking • Create SIDU documents per unit and provide formative assessment resources to teachers	• Group similar math standards with an overall heading, then separate out by specific parts of the standards • Color code according to Readiness and Supporting standards • Make tracking horizontal, rather than vertical

Additional analysis of the focus group transcript included analyzing the data for connections to the themes identified from the classroom observations and documents; these were 1) the language of the standards, 2) growth, 3) seeing, 4) ownership of learning, 5) feedback, and 6) SIDU management. The previously used codes from the analysis phase, along with a descriptor and a sample excerpt from the focus group is shown in Table 4.11. Connections to these themes were found throughout the focus group interview.

Table 4.11 Identified Codes, Descriptors, and Excerpts from Teacher Focus Group

Code	Descriptor	Excerpt from Data
The Language of the Standards	Comments related to the language used in the Texas Math Standards (TEKS)	"I was surprised that students understood the TEKS."
Growth	Comments related to growth and improvement in learning	"I liked the shading and seeing the growth. I liked the NY."
Seeing	Comments related to visually seeing learning progress	"I think students enjoyed seeing their progress and got excited when they got to shade over NY."
Ownership of Learning	Comments related to the ownership of learning	"It [SIDU] helped students take more ownership of their learning."
Feedback	Comments related to teacher feedback on learning or tracking during SIDU	"It [SIDU] allowed me to go around and see which students were getting it and which ones needed my help."
SIDU Management	Comments and actions related to the SIDU tracking process	"It [SIDU] was easier than I thought."

Teachers identified that students used the language of the standards and not only had a better understanding of what they were learning, but they also were able to identify the math standards for their learning. One teacher stated, "Students told you which standard the problem went with. Students knew where to go [to track]." Teachers also referred to the standards in their suggested modifications to the SIDU document in how they wanted the standards grouped and that they wanted the reflections to match the way the standards were divided up on the tracking document.

Teachers referred to the themes of seeing and growth during the focus group interview. They connected the representation of shading and NY to the concept of student growth. Teachers described that they were able to see their students' progress, and see where students were struggling. One teacher commented, "It makes it easy for me to see which students needed help." Another teacher explained, "If I saw that the majority of students got NY, I knew I needed to talk about it." Another teacher also identified that it allowed for her to see if she was focusing on one TEKS too much and that she needed to assess other TEKS. Teachers also felt that students enjoyed seeing their progress and seeing their strengths and weaknesses.

Teachers also described ways that the SIDU process helped improve ownership of learning both for themselves and for students. One teacher reflected, "It made it a team effort. It was me teaching the TEKS and them owning the TEKS." Teachers also referred to the SIDU process providing feedback for themselves and for students. They felt that the tracking provided feedback for them on what students were struggling with and which students were struggling. They also felt it provided feedback to students when students worked with peers, and also in the way students could identify where they struggled.

Finally, teachers discussed managing the SIDU document and processes as well. Teachers were initially concerned about the time for tracking, but found that it really did not impact time as much as they'd anticipated; although they did identify that the reflections were time consuming. A few students lost their documents, but teachers felt that this was to be expected and said that they provided students with a replacement document. Teachers admitted that the intervention ended up being easier than they first thought, and they felt that students would become even more comfortable with the process over time. One teacher commented, "They picked it up [SIDU] really fast. They didn't dread it."

Results of Research

While the results found in other research studies on SIDU were confirmed in this study, additional findings relative to the individual teachers and the district resulted from the research. Because the context involves specific grade and subject level teachers in a suburban school district in central Texas, the results are not generalizable to the larger population.

Research Question 1

How, why and to what extent are the district's sixth, seventh, eighth, and algebra I math teachers currently using student-involved data in their classrooms?

Data indicated that approximately two-thirds of the district secondary math teachers in STAAR tested grade levels were using SIDU in some way in their classrooms and that most of the teachers were asking students to track grades from their unit summative assessments. Some teachers had students track data from the math learning standards, but more than twice as many teachers had students track this data on the unit tests rather than on progress throughout the unit and during the learning process.

The results of the data indicated that the main reasons teachers had students track data was for students to take ownership of their own learning or so that students would have an awareness of their strengths and weaknesses; several teachers cited both of these reasons. Teachers also cited various other reasons for using SIDU, which were for students to have an awareness of their progress, to support student improvement, or for students to use the data for setting goals. Teachers also cited that they used SIDU to help encourage and motivate students and to inform them (the teacher) of what to focus on in instruction.

While the survey reinforced my general perceptions of how and to what extent teachers were using SIDU in their classrooms, it further revealed the reasons why teachers were using

SIDU. I did not have an understanding of the reasons for this and the survey clarified these reasons. The results from research question one was also similar to other findings in the current research on SIDU.

After analysis of the survey, I found one question remain unanswered: 1) What reasons do teachers give for having students track their grades rather than their mastery on learning standards? Or, why do teachers have students track both forms of data?

Research Question 2

What interactions are observed in classrooms implementing a mastery oriented student-involved data use intervention using formative assessment?

Analysis of the interactions observed in classrooms implementing the SIDU intervention revealed that while initial use of the intervention was challenging, students and teachers quickly adapted and became comfortable with the process. Between the first observation on the day of implementation and the second observation, teachers had integrated it into other processes in their classrooms and had made various adjustments, and students seemed adept at the tracking process.

Students began to speak in the language of the math standards and had an awareness of what they were learning in terms of the standards. While observing, I frequently heard students refer to their learning in the language of the standards, such as "verbal descriptions, from a table, and ordered pairs." On their SIDU tracking documents, students referred to the TEKS coding and used the language of the standards when reflecting on their learning. Teachers seemed both pleased and surprised that their students could identify and use the language from the standards and students seemed proud of identifying and using the language of the standards when tracking.

Although it was not entirely evident that students clearly understood the meaning behind NY for not yet on the SIDU tracking document, teachers emphasized this concept and referred to growth during the process. It was evident from the documents and reflections, though, that students understood when they had multiple NYs that this was an area of weakness and that shading indicated an area of strength. Students also wrote written reflections on the SIDU tracker about areas that had more shading as opposed to areas with more NYs and explained what they could do to work on the concepts that had more NYs. They also referred to areas where they shaded over the NY. In this way, it appeared that students did have an understanding that although they struggled with a concept, they could improve.

The SIDU process also provided both teachers and students a visual representation of learning throughout the unit. Teachers referred to seeing their students' progress, seeing what students were learning, and seeing where students were struggling. Students referred to seeing shading in one area and seeing NY in another and being able to see their progress on learning as they shaded in their graphs. The SIDU tracking document became a visual representation of learning progress throughout the unit for both teachers and students.

Analysis of the interactions in classroom observations and the SIDU documents also revealed characteristics of students' ownership of learning. Students readily tracked their data on learning standards by shading or entering NY on the SIDU document and appeared to be engaged in the process. Students reflected on specific standards and parts of standards by discussing areas of strength and areas for which they struggled, and they also reflected on ways to improve on specific TEKS and in their overall learning for the unit.

Teacher feedback was consistently provided to students during the SIDU intervention. Teachers were interested in what students were learning and where they were struggling and

provided various forms of feedback as students tracked their progress. Teachers provided both whole group and individual feedback to students on the content being learned and on the SIDU tracking process. Peer to peer feedback was also observed in classrooms where teachers paired students up during the SIDU intervention process.

Finally, although the first observation focused on the processes involved for the SIDU intervention and on the SIDU document, the second observation revealed that the SIDU process and management of the document were easily managed. Teachers had integrated SIDU tracking into other classroom assignments and activities and had begun coding TEKS for ease of tracking for students. Students tracked their progress on the SIDU document and reflected on their learning, and in one class, a student even reminded his teacher about tracking on the SIDU document.

In seeing what I perceived to be several benefits to both students and teachers in using SIDU for tracking learning on the math standards during the unit, and in seeing how quickly students adapted to the process and even appeared to enjoy it, I had one question after this phase of the study, which was similar to my question after the survey: Why were the majority of teachers in the district having students track grades or TEKS on unit tests at the end of learning rather than tracking learning on TEKS during the unit when learning could be impacted?

Research Question 3

What benefits, limitations, and modifications do teachers identify for future use of mastery oriented student-involved data use using formative assessment?

Teachers found several benefits for themselves and for students with the SIDU intervention. They felt that students generally enjoyed the tracking process and felt that students had a better understanding of their learning progress and of what they were learning. They did

not anticipate that students would understand the language of the math standards, and seemed surprised that their students had this ability. Teachers also felt that it benefitted students to be able to see their strengths and weaknesses during learning by shading and writing NY on their SIDU document. They observed that SIDU supported student ownership of learning by allowing students to understand what they struggled with in order to address it during the unit.

Teachers also saw benefits for themselves in using the SIDU intervention. They commented on the various ways SIDU provided them information such as where they needed to adjust instruction, what specific TEKS students were struggling with, and which students were struggling. Teachers also enjoyed seeing students' learning growth on the SIDU tracking document.

Teachers identified a few limitations with the SIDU intervention for students and themselves. For students, their major concerns were with the management of the SIDU tracking document and with the ability for students to have an awareness of their grades and whether they were passing or failing their class. For themselves, teachers primarily focused on the limitations of the student written reflection section of the SIDU tracking document, and not the tracking of the standards. Limitations concerned the time involved for students to write the reflections, the frequency with how often to reflect, and with the student quality of the reflections.

Teachers had several suggestions for modifications for the use of the SIDU process in the future. To the actual SIDU document, teachers offered suggestions for color coding and grouping of the standards for ease of locating for students, and suggested that a horizontal orientation would allow students to read the words of the standards more easily. They also suggested starting the SIDU intervention at the beginning of the year so that it became a part of classroom routines. Teachers had many suggestions for modifications to the written reflection piece. They felt that it

would be easier for students if the reflections matched the broken down pieces of the standards on the tracking document and felt that reflections should be done periodically, rather than daily. Finally, teachers recommended that the needed documents and resources should be provided at the district level matching the math units because of the lack of time for them to locate resources and create SIDU tracking documents.

Interaction Between the Research and the Context

Secondary math teachers in STAAR tested grade levels in the district frequently use data to analyze student performance and to inform their own instruction. As district math coordinator, I had engaged in informal conversations with teachers who used SIDU in their classrooms and frequently observed this practice in classroom observations. Several teachers also shared the documents they used for SIDU with me and with other math teachers in the district. The majority of what I observed involved SIDU tracking on grades and tracking was primarily on unit tests. I had general knowledge of some of the research on performance and mastery orientations, so I was concerned that the tracking of grades might be less beneficial, or even detrimental, to students rather than the tracking of mastery on learning standards. I also felt that tracking grades after learning had taken place on the unit test really did not provide students or teachers with specific information about what was learned, nor did it provide an opportunity to intervene on during the learning process. In addition to this, while doing a district walkthrough after observing students in math doing math warm-up problems, the district Executive Director for Secondary Education commented that tracking of the data from the warm-ups with students would be a powerful strategy. This prompted my interest in researching and studying SIDU in order to provide guidance for practicing it in a way that would be more beneficial to students and teachers.

How did the Context Impact the Results

Since my position involves frequent interactions with secondary math teachers who teach STAAR tested grade levels, the context had little impact on the results. The only issue that arose was due to the timing of conducting the classroom observations. I felt that observations were best conducted prior to spring break and before STAAR reviewing and testing began. This caused me to feel somewhat rushed in preparing for the observations, but because I observe in classrooms often and am also familiar with teachers, I had confidence that I would be in the right frame of mind to complete my observations. This also heightened my awareness to be careful in following the protocol created for the observations.

Prior to the observations and focus group, I met with the teachers agreeing to participate in the intervention and felt comfortable with their abilities to implement and use the SIDU intervention. The teachers in the observation and focus group sample seemed honored and excited to participate. I also met with the district Assistant Superintendent of Curriculum and Academics to inform her about the study outline and its purpose, and to seek feedback on any input she might have. She was supportive of the research study and was interested in the results, and she also assisted me in narrowing down the sample of teachers to be used for the classroom observations and focus group. No operational issues arose other than adjusting my schedule to make sure I was able to observe on the first day of the SIDU intervention implementation and then conduct a follow-up observation on a day when student tracking occurred and after teachers and students had ample time to become comfortable with the process.

How did the Research Impact the Context

The research impacted the context by providing an understanding of the extent to which district secondary math teachers were using SIDU in their classrooms and why they were using

it. The classroom observations and the teachers in this study provided critical feedback to inform the use of SIDU in the district regarding what is practical to implement in a real-world context and regarding what support is needed to encourage and implement the practice in the future. The study will also allow me, as the district math coordinator, to effectively communicate to teachers and district administrators in future professional development and discussions the relevant literature on the research-based practices that can be supported while using SIDU.

Summary

Data analysis from this study sought first to understand the current context for the use of SIDU by secondary math teachers in the district. The results indicated that the majority of teachers in the district used SIDU oriented toward the performance tracking of grades rather than mastery on learning standards, and illuminated that the major reasons teachers used SIDU was for students to own their own learning and for students to have an awareness of their strengths and weaknesses. This information was used to create a SIDU intervention, with a mastery orientation, for use in secondary math classrooms in order to analyze the practical use of the intervention in the district in the future. Finally, feedback from teachers was elicited to identify the benefits, limitations, and suggestions for modifications of the SIDU intervention for future use in the district.

The use of the SIDU intervention revealed multiple benefits to both students and teachers, including the ability for students to be involved in the ownership of their own learning and to understand their learning in terms of the math standards. Students and teachers also benefitted from being able to see a visual representation of learning with an emphasis on growth. Finally, use of SIDU for tracking learning rather than grades proved to be a feasible practice for both teachers and students with the needed supports from the district. The results also allowed

for identification of modifications to the SIDU intervention in order to further refine use of SIDU in the future.

CHAPTER V

SUMMARY AND CONCLUSIONS

Prior to this study, I had some understanding of how and to what extent teachers were using SIDU in their classrooms. My perception was that a majority of secondary STAAR tested grade level math teachers were using SIDU in some way, and that most of those using SIDU were having students track their data in the form of grades on unit tests. What I had little understanding of was the reasons why teachers were using SIDU. The survey data reinforced my assumption that a large majority of teachers were using SIDU in their classrooms and that the main type of data students were tracking were grades on unit tests. The survey, though, clarified the reasons why teachers were using SIDU with their students. The primary reasons teachers cited were for students to take ownership of their learning and to have an awareness of their strengths and weaknesses. Several teachers also identified that they wanted students to be aware of their progress, improve their learning, and set goals

The classroom observations and SIDU tracking documents also revealed that the SIDU tracking process was a struggle for teachers and students in the beginning, but students adapted to it relatively quickly and appeared to enjoy the process. Teachers also adapted the process to other forms of assessment activities in their classrooms and verified that their students adapted to the process as well. Finally, one hurdle that seemed to have not been a major hurdle was the impact SIDU was anticipated to have on time – a valuable commodity in classrooms. When teachers referred to the tracking alone, time did not seem to be impacted, but they did see the issue of time being impactful in relation to the resources needed for the use of SIDU and in the written reflections included in this SIDU intervention.

The most important findings from this study are in relation to the SIDU intervention teacher and student actions and comments. Many of the actions and comments found in the SIDU intervention embodied practices found in other educational research practices that have been found to positively impact student learning. Students used the language of the standards as they tracked and had an overall awareness of what they were learning.

Teachers also reinforced not yet mastering a concept, and used the process of shading on the SIDU document to show students that "not yet" was temporary and could be shaded over when mastery occurred. Students also referred to the NY coding for not yet in the reflections on their documents and understood that this identified math concepts for which they struggled.

The SIDU tracking document also served as a visual representation of student learning and contributed to the ownership of learning for both teachers and students. Students could see their progress as well as their strengths and weaknesses and teachers could see which students were struggling and with what concepts. Students used the SIDU tracking to identify areas they needed to improve upon and commented on specific goals for improvement in their reflections.

Discussion of Results in Relation to the Literature

The current literature on SIDU is scarce. Most SIDU studies involve analysis at the district, school, and teacher level. Only one study, found while conducting the current action research study, involved the classroom level. The research conducted in this study is at the teacher and classroom level. The framing of SIDU in this study is also within the contexts of formative assessment and mastery orientations, which both have strong research bases.

Jimerson and Reames (2015) posit,

> In the world of practice, educators should engage in inquiry-based continuous improvement efforts whereby they examine best practices and research, try out new strategies, measure results, and make adjustments toward improvement. In the ideal world, practitioners share this knowledge with researchers and with other

> practitioners, so that constructive strategies can "bubble up" and be dispersed throughout the field" (p. 295).

In the case of SIDU, this has not occurred. Practice has preceded research, largely because of the demands by school administrators on teachers to be data-driven and to involve students in their own data. Additionally, the practice is not only recommended by leaders in schools, but was also a recommended practice in the Institute of Education Sciences practice guide even though there was little evidence for its effectiveness (Hamilton et al, 2009). Finally, it is believed teachers want their students to be successful and have made the connection that the use of data has improved their own practice, so they see the merits of involving students in data. It is therefore logical that teachers would employ the practice of SIDU.

Jimerson and Reames (2015) identify that the use of SIDU in schools is imperfect. The authors observe, "Practitioners have taken the sound body of evidence on formative assessment practices, paired it with evidence on continuous improvement (in- and outside of education), and determined that the intersection of these practices provides a useful approach to working with students" (p. 295). While this may be viewed as careless on the part of teachers, which is cautioned by Jimerson and Reames (2015), without guidance on best practices surrounding SIDU, this also seems a logical move on the part of teachers. Additionally, when paired with the pressures and expectation from school administrators to enact SIDU in classrooms, it seems an expected move from teachers.

Jimerson and Reames (2015) identify that what has been overlooked in the SIDU research is how feedback can affect students differently depending on a student's goal orientation for learning. The authors suggest that the use of SIDU, framed within a mastery orientation and focusing on growth and improvement, rather than on performance, "…could help students engage in the use of personal data in constructive ways" (p. 288). Because most SIDU

practices in secondary math classrooms in the district were found to align with the practices found in the literature by promoting a performance orientation, a viable alternative was enacted. This alternative, suggested by Jimerson and Reames (2015), was utilized even though research has not thoroughly proven its effects.

So, while enacting SIDU within a framework of formative assessment, which has been found to be effective in improving student outcomes, may appear to some to be unguided by research, using formative assessment practices for SIDU is well grounded in research. Formative assessment has a strong research base and has been proven effective even when variations and oversights in its use occur (Wiliam, 2011).

The primary issue surrounding SIDU practices is the predominant use of tracking grades and promoting a performance rather than a mastery orientation supporting learning growth. The SIDU intervention used in this study sought to begin to effect this change in practice toward the tracking of mastery on learning standards rather than on performance. Additionally, the use of formative assessment as the data used for tracking was intentional and based on research.

The initial phase of the study was a survey sent to secondary math teachers in the district, and sought to answer question one in the study. Findings from the survey had similarities with much of the literature on SIDU regarding teacher SIDU practices and beliefs. Findings in the district aligning to SIDU research were:

- The majority of teachers have a general belief that SIDU is beneficial to students (Marsh et al., 2016).
- Teachers are using SIDU despite a lack of understanding about best practices or outcomes (Jimerson & Reames, 2015).
- Over two-thirds of teachers were using SIDU in their classroom (Marsh et al., 2016).

- The majority of the types of data teachers were using for SIDU related to student performance rather than mastery on content (Marsh, et al., 2016).
- Teacher reasons for using SIDU included encouraging students to own their own learning and to increase student effort (Jimerson et al., 2016).
- The implementation and goals for using SIDU varied among teachers (Jimerson et al, 2016).

The survey was followed by the use and study of a SIDU intervention involving students in monitoring, reflecting, and setting goals for learning, which aligns with SIDU goals described in the literature (Kennedy & Datnow, 2011). However, the intervention did not involve SIDU practices found in the literature involving public displays of data, the keeping of data folders, or parental involvement in data. It aligns more with the recent study by Jimerson et al. (2018) where student data is kept private. The data tracked by students in four of the five classrooms used in this study was stored in a binder or notebook consistently used in the classroom for housing other math classwork. Finally, the SIDU intervention in this study was not a use of data separate and apart from learning, but was integrated into and became a part of the learning process: a practice which seems a better way to communicate the importance of knowing what is being learned and identifying whether learning is taking place.

The SIDU intervention confirmed findings consistent in the literature in multiple ways, including the benefits of formative assessment, elements of self-regulation, and the focus on a mastery orientation. Cowie and Bell (1992) define formative assessment as "the process used by teachers and students to recognise and respond to student learning in order to enhance that learning, *during* the learning" (p. 32, emphasis added). Several teachers using the intervention stated that SIDU allowed them to identify where students were struggling so that they could

respond to this in their instruction. Wiliam (2011) clearly defines that a formative assessment is meant to "shape instruction" (p. 40), and while this was not specifically observed in practice, teachers later spoke about being able to use SIDU tracking to adjust their instruction and address specific math concepts for which students were struggling. In their recent study on SIDU, Jimerson and Reames (2018) also found this to be a common practice amongst teachers.

Formative assessment also involves providing feedback to students, which was consistently observed in the SIDU intervention. While the literature on feedback specifically identifies specific types of feedback most beneficial to students, the feedback in this study was not analyzed in this way. What was observed was that feedback was consistently provided to students, thus providing an opportunity to recognize that addressing feedback in using SIDU with formative assessment should also involve discussions and coaching of teachers to provide the most effective types of feedback. While the SIDU intervention observed in the district varied among teachers, activities aligning to formative assessment practices were observed. Wiliam (2011) posits that even when there are minor differences or mistakes in using formative assessment practices, significant increases in student achievement can still occur.

Teachers identified one of the reasons they used SIDU was to encourage students to become self-regulated, or to own their own learning. The literature on self-regulated learning defines it as the ability for students to coordinate their abilities, actions, and efforts to meet their learning goals (Boekaerts, 2006). Wiliam (2011) suggests teacher actions to encourage students to become owners of their own learning, which includes sharing learning goals so students can monitor their progress, providing feedback to students, and taking advantage of opportunities to transfer the ownership of learning to students. Additionally, Zimmerman (2002) identifies three stages of self-regulated learning, one of which is activating the learner to assess his performance

in relation to the learning. Results from the SIDU intervention and documents revealed elements of all of these actions, consistent with the literature on self-regulated learning.

One finding diverging from the literature on SIDU in this study was the lack of time for teachers to prepare materials for using SIDU, as well as for the time needed to use it in the classroom (Jimerson et al., 2016). Several actions alleviating the lack of time in this SIDU study were that teachers were provided with the SIDU tracking document matching the standards from the unit, along with a bank of formative assessment items to use for tracking. Teachers also individually adjusted the SIDU tracking process by having students track daily, and only periodically do written reflections. While the literature recommends using a mastery orientation instead of a performance orientation when enacting SIDU (Jimerson & Reames, 2015), this change in practice does in fact require more time, therefore teachers need resources and support to alleviate time constraints where this is an expectation.

Another issue identified in a SIDU study by Jimerson et al. (2016) was the struggle for students to track, use, and reflect on their data, but the study involved elementary teachers and students. This was not an issue in this study for sixth grade students in the district, except on the first day of implementation, so SIDU practices seem practical for middle school students; although, as previously noted, the daily written reflections were somewhat challenging.

One of the primary intents of the SIDU intervention was to begin to shift district SIDU practices from the use of tracking grades to tracking mastery of learning standards. The SIDU intervention used in this study supports a mastery goal orientation which has been linked to increases in student self-efficacy, improved student interest, better performance, and a belief that effort leads to achievement (Ames, 1992; Dweck & Leggett, 1998; Pintrich, 2003; Seifert, 2004). The SIDU intervention used in this study was framed within a growth mindset context

supporting a mastery goal orientation and used the words "not yet" on the tracking document to encourage and reinforce student growth. The results of the SIDU intervention in this study also indicate teachers' understandings of cultivating and supporting students' growth mindsets. Dweck (2006) posits that in order to have a growth mindset, students must have an awareness of what they know and do not know in order to affect learning. Evidence of this was found in the way students referred to the specific TEKS in their comments and on their SIDU tracking documents. The SIDU documents also revealed support of students' growth mindsets in their written reflections identifying their strengths and weaknesses and in their descriptions of what needed to be done to improve. The results of the study also indicated that teachers supported their students' growth mindsets by emphasizing that "not yet" was temporary and by emphasizing that NY could be shaded over on the SIDU tracking document when mastery occurred, as suggested by Dweck (2014, November). While supporting a growth mindset is discussed in relation to SIDU in the literature and in the ways teachers used SIDU to support and celebrate student growth, it is discussed as an outcome of SIDU practices, rather than as a critical element emphasized in SIDU practices. In the SIDU intervention used in this study, supporting and encouraging a growth mindset was a critical piece of the SIDU intervention in supporting a mastery goal orientation.

One significant finding predominate in this study, but only recently published in the literature on SIDU by Jimerson et al. (2018), was the referral by both teachers and students of the visual representation of learning that SIDU provided. Both teachers and students consistently commented about "seeing" learning. Because the intervention involved tracking on mastery of the learning standards during the learning process, and was not a summative representation of learning, the ability for teachers and students to see a visual representation of learning during the

learning process was impactful. The literature only recently addressed this nuance. Jimerson et al. (2018) note the significance of the "visual reminders" to both students and teachers when using SIDU (pp. 9 & 12). Further connections regarding the impact SIDU has on students and teachers because of its visual representation of learning is significant, and calls for further research in relation to the visual representation provided by SIDU and this benefit for students and teachers.

Another significant finding in the study not discussed in SIDU literature relates to sharing the learning objectives in SIDU tracking with students. Sharing learning objectives is suggested in the literature on formative assessment (Leahy, 2005; Wiliam, 2011). Wiliam (2011) posits, "Student-friendly language can be useful as students are introduced to a discipline, but it is also important to help students develop the habits of mind that define the discipline, and coming to terms with the 'official' language is part of that process" (p. 65). Because the SIDU intervention involved the use of formative assessment by tracking mastery on learning objectives, the SIDU tracking document used the academic language for tracking found in the math standards.

In addition, a number of research studies apart from the literature on formative assessment have also identified the positive impact of sharing learning objectives with students (Tall, 1994; White & Fredericksen, 1998), and have even found this practice to be more impactful with lower achieving students (White & Fredericksen, 1998). The use of academic language is important for student achievement (Freeman & Freeman, 2003; Nagy & Townsend, 2012; Short, Fidelman, & Louguit, 2012). Additionally, academic vocabulary development contributes more to a student's success in the content areas than does an extensive vocabulary in general (Townsend, Filippini, Collins, & Biancarosa, 2012). What is significant in this SIDU intervention study is that students consistently spoke in the academic language used in the math

standards while using SIDU. The SIDU intervention used in this study was found to significantly contribute to the use of academic language in the classroom, and in fact, appeared to be much more impactful than posting the learning objective on the board at the front of the classroom, which is a common practice found in the district, and used in many classrooms in the educational community. The tracking of mastery on learning objectives in SIDU therefore has the potential to support the use of academic vocabulary in classrooms, which calls for further exploration and study in relation to the benefits of SIDU for students.

Implications for Practice

There are several implications for the use of SIDU in secondary math classrooms in the district. A major implication is that SIDU has not been thoroughly researched, so ongoing examination of the research on SIDU is essential. First, to enact the SIDU practices used in this study, a refinement of the recommended SIDU guidelines and the creation of SIDU tracking documents per math unit are necessary for sharing with district secondary math teachers. As supported in previous research and in this study, teachers do not have time to properly plan and prepare for SIDU, so tracking documents for each unit along with resources to use for formative assessment should be provided to teachers. While teachers were provided with a bank of items for use as formative assessments for this study, teachers do have multiple resources provided by the district that could easily be utilized for formative assessment as well. Recommendations should be made to identify the specific resources teachers could use for SIDU. Providing them with these documents and resources, along with recommended guidelines, will begin to encourage movement of SIDU practices from emphasizing performance and grades to SIDU practices emphasizing mastery and learning.

Second, professional development for secondary math teachers is recommended to provide district SIDU guidelines, including a brief overview of the research on SIDU and its related educational practices such as formative assessment, mastery orientation, growth, and self-regulated learning. Professional development should also include: 1) SIDU guidelines and documents for each unit along with formative assessment resources, 2) best practices for SIDU document management, 3) variations on enacting SIDU in the classroom and 4) suggestions for when to have students reflect on their learning, along with examples for teachers to use to model quality written reflections with their students. Job-embedded follow-up support should also be provided to the teachers choosing to use the mastery oriented SIDU practice in their classrooms. Teacher feedback on the SIDU process, guidelines, and documents for ongoing revision and refinement should be solicited from teachers. Additionally, teachers who also use SIDU with a performance orientation should be allowed to continue to do so until the research is clear that the tracking of performance, especially when accompanied by tracking on mastery, is not beneficial to students. Last, collaboration with campus and district stakeholders to discuss recommendations for SIDU at the district level should be addressed.

Connections to Context

As district Math Coordinator, I have worked directly with secondary math teachers on campuses in the district for the past five years. During this time, teachers have implemented rigorous new math standards, and their students have produced impressive achievement results on STAAR. Managing and providing leadership from my perspective has evolved from the communication of alignment to the math standards and best practices in math instruction to refinement of specific practices within math classrooms to support student learning. Noticing varying SIDU practices in secondary math classrooms led me to begin investigating the research

on SIDU. Through this research, I found that much of the SIDU practices in the district aligned to practices that were not always found to be beneficial to students, so this inspired me to try to impact changes to SIDU practices in the district.

Connections to Field of Study

While SIDU has a limited research base, the research conducted in this case study confirmed several findings in previous research on the subject. SIDU is generally viewed by those in the educational community as being beneficial to students, but additional research is needed to understand SIDU and identify best practices for its use. SIDU is also being used by an overwhelming majority of teachers regardless of the lack of existing research; therefore, additional research is needed to understand SIDU and identify best practices for its use.

Jimerson and Reames (2015) emphasize the importance of identifying the benefits of SIDU as well as identifying the risks when SIDU is enacted in careless ways. The field of study has found that the majority of teachers are using SIDU with a focus on performance and grades, which is not beneficial to most students, rather than focusing on mastery and learning, which is a better alternative. This was also a consistent finding regarding the district for this study. Therefore, a solution was sought to begin to shift SIDU practices to a mastery orientation in the district.

This research study also seeks to identify some of the benefits of SIDU when enacted through the lens of other research-based practices with proven positive results including formative assessment and encouragement of a growth mindset. Multiple benefits to students and teachers were identified, including benefits identified in formative assessment practices, self-regulation, and encouraging a growth mindset.

Different from the current literature on SIDU, use of SIDU tracking with sixth grade math students was not problematic and was easily integrated into everyday math classroom practices. Additionally, teachers in this study did not appear to struggle with the lack of time to enact SIDU as identified in much of the literature on SIDU. This was due, in part, to being provided the SIDU tracking document aligned to the current unit of study and with formative assessment items for use in assessing learning.

Two significant findings identified during the SIDU intervention were the visual representation of learning SIDU provided to both teachers and students and the regular use of math academic language by students during the SIDU intervention. The visual representation SIDU provides to teachers and students is moderately discussed in a recent study by Jimerson et al. (2018). Additionally, in an early study on formative assessment, Fuchs and Fuchs (1986) found that when data was displayed in a graph and used by teachers, student achievement increased. The authors reasoned that the finding was due to teachers being able to analyze the graphed data more precisely and more often or that the graphs assisted with more frequent feedback to students. While this explanation is plausible, it is equally as plausible to ponder whether the visual representation of the data is more powerful or impactful and thus has more meaning to teachers to act on the data. When studying whether SIDU is beneficial to teachers and students, consideration and study regarding the power and impact of the visual representation of data is significant and necessary.

Finally, the frequent use of academic language by students in the SIDU intervention used in this study is significant. Formative assessment practices emphasize the use of sharing the learning objectives with students so that students have an awareness of what they are learning and suggests using the academic language of the content with students. In this study, SIDU

provided a platform for further emphasis on the academic language of the content by cultivating students' ability to speak in the language of the standards and use specific math content vocabulary. While this can be attributed to the use of formative assessment for the data collected and graphed in the SIDU intervention, the platform of SIDU tracking with the language of the standards attached to the data students tracked, supports the more frequent use of academic language by students. Therefore, SIDU with a mastery orientation can be viewed as a means of supporting the use of academic language, which is a discussion not found in the literature on SIDU.

Discussion of Personal Lessons Learned

Conducting action research during the Record of Study process provided me with learning opportunities beyond what I had anticipated. I learned things about myself, about the research process, and about teachers. I learned that for me, writing cannot be forced and ebbs and flows, but that discussing my thinking with someone else actually helps feed the writing process and keeps it going. I also learned that the most difficult part of the ROS was in the data collection and analysis, but it also came with incredible satisfaction when themes began to emerge in what appeared to be a messy, conglomeration of data. Following data analysis, though, seeing the connections between the data and the connections to the literature was exciting and worth the effort. The final thing I learned is that when you give permission to teachers to make mistakes and to play with the implementation of new initiatives, they will provide you with honest, useful feedback to refine and improve the initiative. Sometimes I feel that professional development is provided to teachers and the expectation is for the learning to transfer seamlessly into classroom practice without allowing teachers the ability to ask questions, make mistakes, make adjustments, and provide honest feedback.

Recommendations

The literature recommends additional research for understanding the contexts in which SIDU is most beneficial. Although it is generally viewed in the educational community as a beneficial practice and was also recommended in the 2009 Institution of Education Sciences Practice Guide (Hamilton et al., 2009), SIDU practices need further exploration to identify specific practices that benefit both students and teachers. Because the literature identifies that most SIDU practices involve the tracking of grades (Marsh et al., 2016), specific recommendations are that additional empirical research be conducted to compare performance, achievement, and growth outcomes for students using SIDU with a mastery orientation versus use of SIDU with a performance orientation and then in comparison to the use of both types of data. Additional research is also needed to identify the impacts and benefits to teachers when using SIDU with a mastery orientation, and to identify the contexts for which teachers are most likely to adopt the practice. Finally, based on the research in this study, further exploration regarding the impact to teachers and students of SIDU as a visual representation of learning, along with the support of academic vocabulary SIDU can provide when enacted through a mastery orientation lens, needs further investigation.

Closing Thoughts

The use of data is found in virtually every aspect of education, so it is not surprising that teachers employ SIDU practices and involve students in tracking and analyzing their own data even though SIDU has not been thoroughly researched to provide guidance on best practices. The data most tracked by students, though, is in the form of grades rather than on mastery of learning standards, even though mastery orientations have been found to produce more positive student outcomes. While SIDU has not been fully researched in order to outline best practices,

when it is enacted with a mastery orientation and encompasses the features of other educational practices with a solid research base, such as formative assessment, self-regulated learning, and support for student growth, SIDU holds promise to provide numerous benefits to both students and teachers.

As Guskey (1986) establishes, teacher change in practice results when the practice is found to impact student learning in the classroom; therefore, teachers must experience the positive impacts to student learning when using SIDU with a mastery orientation in order to fully adopt its use. Hall and Hord (2014) also remind us that change requires support, time, and a shared vision among leaders. For SIDU to shift to practices that promise to be more beneficial for students, school leaders must provide the resources, time, and support to allow teachers to grapple with and experience its impacts in order to encourage adoption in a context that is more beneficial to students.

REFERENCES

Ames, C. (1992). Classrooms: Goals, structures, and student motivation. *Journal of Educational Psychology, 84,*(3), 261 – 271.

Ames, C., & Ames, R. (1984) Goal structures and motivation. *Elementary School Journal, 85*(1), 39 – 52.

Ames, C., & Archer, J. (1988). Achievement goals in the classroom: Students' learning strategies and motivation processes. *Journal of Educational Psychology, 80*(3), 260 – 267.

Anderson, G. L., Herr, K., & Nihlen, A. S. (2007). *Studying your own school: An educator's guide to practitioner action research.* Thousand Oaks, CA: Corwin Press.

Anderson, L. H., Andrzejewski, C. E., & Allen, J. (2011). How do teachers support students' motivation and learning in their classrooms? *Teachers College Record, 113*, 969 – 1003.

Aronson, J., Fried, C. B & Good, C. (2002). Reducing the effects of stereotype threat on African American college students by shaping theories of intelligence. *Journal of Personality and Social Psychology, 38*(2), 113 – 125.

Baldrige Performance Excellence Program. (2015). *2015 – 2016 Baldridge excellent framework: A systems approach to improving your organization's performance (education).* Gaithersburg, MD: US Department of Commerce, National Institute of Standards and Technology.

Berger, R., Rugen, L, & Woodfin, L. (2014). *Leaders of their own learning*. San Francisco, CA: Jossey-Bass.

Black, P. & Wiliam, D. (1998a). Assessment and classroom learning. *Assessment in Education, 5*(1), 7 – 74.

Black, P. & Wiliam, D. (1998b). Inside the black box: Raising standards through classroom assessment. *Phi Delta Kappan, 80*(2), 139 – 148.

Blackwell, L. S. Trzesniewski, K. H., Dweck, C. S. (2007). Implicit theories of intelligence predict achievement across an adolescent transition: A longitudinal study and an intervention. Chi*ld Development 78*(1), 246 – 263.

Bloom, B. S. (1969). Some theoretical issues relating to educational evaluation. In H. G. Rickey & R. W. Tyler (Eds.) *Educational evaluation: New roles, new means, pt. 2* (Vol. 68, pp. 26 – 50). Chicago: University of Chicago Press.

Boaler, J. (2015). *Mathematical mindsets: Unleashing students' potential through creative math, inspiring messages and innovative teaching*. San Francisco, CA: Jossey-Bass.

Boekaerts, M. (2006). Self-regulation and effort investment. In K. A. Renninger & I. E. Sigel (Eds.), *Handbook of child psychology: Vol. 4. Child psychology in practice* (6th ed., pp. 345 – 377). New York, NY: Wiley.

Brummelman, E., Thomaes, S., OVerbeek, G., Orobio de Castro, B., van den Hout, M. A., & Bushman, B. J. (2013). On feeding those hungry for praise: Person praise backfires in children with low self-esteem. *Journal of Experimental Psychology: General, 143*(1), 9 – 14.

Butler, D. H., & Winne, P. H. (1995). Feedback and self-regulated learning: A theoretical synthesis. *Review of Educational Research, 65*(3), 245 – 281.

Butler, R. (2000). Making judgments about ability: The role of implicit theories of ability in moderating inferences from temporal and social comparison information. *Journal of Personality and Social Psychology, 78*(5), 965 – 978.

Case, L. P., Harris, K. R., & Graham, S. (1992). Improving the mathematical problem-solving skills of students with learning disabilities: Self-regulated strategy development. *The Journal of Special Education, 26*(1), 1 – 19.

Chow, A. (2010). Improving learning through student-involved assessment. *The International Journal of Learning, 16*(12), 87 – 100.

Ciani, K. D., Middleton, M. J., Summers, J. J., & Sheldon, K. M. (2010). Buffering against performance classroom goal structures: The importance of autonomy support and classroom community. *Contemporary Educational Psychology, 35*(1)*,* 88 – 99.

Claro, S., Paunesku, D., Dweck, C. S. (2016). Proceedings of the National Academy of Sciences of the United States of America, 113 (31): 8664-8668; National Academy of Sciences, 2016.

Corpus, J. H., & Lepper, M. R. (2007). The effects of person versus performance praise on children's motivation: Gender and age as moderating factors. *Educational Psychology, 27,*(4), 1 – 22.

Cowie, B., & Bell, B. (1999). A model of formative assessment in science education, *Assessment in Education: Principles, Policy and Practice, 6*(1), 32 – 42.

Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches.* Thousand Oaks, CA: Sage.

Data Quality Campaign. (2011). *Data: The missing piece to improving student achievement.* Washington, DC: Institute of Education Sciences.

Desimone, L. M., & Le Floch, K. C. (2004). Are we asking the right questions? Using cognitive interviews to improve surveys in education research. *Educational Evaluation and Policy Analysis, 26*(1), 1 – 22.

Dweck, C. (1986). Motivational processes affecting learning. *American Psychologist, 41*,(10), 1040 – 1048.

Dweck, C. (2006). *Mindset, the new psychology of success.* New York, NY: Ballantine.

Dweck, C. (2014, November). The power of believing that you can improve [Video file]. Retrieved from https://www.ted.com/talks/carol_dweck_the_power_of_believing_that_you_can_improve?language=en

Dweck, C. (2017). The origins' of childrens' growth and fixed mindsets: New research and a new proposal. *Child Development, 88*(6), 1849 – 1859.

Dweck, C. S., & Leggett, E. L. (1988). A social-cognitive approach to motivation and personality. *Psychological Review, 95*(2), 256 – 273.

Elliot, A. J. (1997). Integrating the "classic" and "contemporary" approaches to achievement motivation: A heirearchical model of approach and avoidance achievement motivations. In M. L. Maehr & P. R. Pintrich (Eds.), *Advances in motivation and achievement* (Vol. 10, pp. 143 – 179). Greenwich, CT: JAI Press.

Elliot, A. J., & Church, M. A. (1997). A hierarchical model of approach and avoidance achievement motivation. *Journal of Personality and Social Psychology, 72*(1), 218 – 232.

Elliot, A. J., & Harackiewicz, J. M. (1996). Approach and avoidance achievement goals and intrinsic motivation: A mediational analysis. *Journal of Personal Social Psychology, 70*(3), 461 – 475.

Freeman, Y. & Freeman, D. (2003). Helping middle and high school age English language learners achieve academic success. *Journal of Research Practice, 1*(1), 110 – 122.

Greene, J. C., Caracelli, V. J., & Graham, W. F. (1989). Toward a conceptual framework for mixed-methods evaluation designs. *Educational Evaluation and Policy Analysis, 11*(3), 255 – 274.

Guskey, T. R. (1986). Staff development and the process of teacher change. *Educational Researcher 15*(5), 5 – 12.

Hackman, J. R., & Wageman, R. (1995). Total quality management: Empirical, conceptual, and practical issues. *Administrative Science Quarterly, 40*(2), 309 – 342.

Haimovitz, K., & Corpus, J. H. (2011). Effects of person versus process praise on student motivation: Stability and change in emerging adulthood. *Educational Psychology, 31*(5), 595 – 609.

Haimovitz, K., Wormington, S. V., & Corpus, J. H. (2011). Dangerous mindsets: How beliefs about intelligence predict motivational change. *Learning and Individual Differences, 21*(6), 747 – 752.

Hall, G. E., & Hord, S. M. (2014). *Implementing change: Patterns, principles, and potholes.* New Jersey: Pearson.

Hamilton, L. S., Halverson, R., Jackson, S. S., Mandinach, E., Supovitz, J. A., & Wayman, J. C. (2009). *Using student achievement data to support instructional decision-making.* Washington, DC: Institute of Education Sciences and the National Center for Education Evaluation.

Harackiewicz, J. M., Barron, K. E., & Elliot, A. J. (1998). Rethinking achievement goals: When are they adaptive for college students and why? *Educational Psychologist, 33*(1), 1 – 21.

Harackiewicz, J. J., Barron, K. E., Carter, S. M., Lehto, A. T., & Elliot, A. J. (1997). Predictors and consequences of achievement goals in the college classroom: Maintaining interest and making the grade. *Journal of Personality and Social Psychology, 73*(6), 1284 – 1295.

Harackiewicz, J. J., Barron, K. E., Pintrich, P. R., Elliot, A. J., & Thrash, T. M. (2002). Revision of achievement goal theory: Necessary and illuminating. *Journal of Educational Psychology, 94*, 638 - 645.

Harris, K. R., Graham, S. & Mason, L. H. (2003). Self-regulated strategy development in the classroom: Part of a balanced approach to writing instruction for students with disabilities. *Focus on Exceptional Children, 35,* 1 – 16.

Hong, Y. Y., Chiu, C., Dweck, C. S., Lin, D., & Wan, W. (1999). Implicit theories, attributions, and coping: A meaning system approach. *Journal of Personality and Social Psychology, 77*(3), 588 – 599.

Hundley, H., & Brock, A. (2016). *The growth mindset coach: A teacher's month-by-month handbook for empowering students to achieve*. Berkeley, CA: Ulysses Press.

Ivankova, N. V. (2015). *Mixed methods application in action research: From methods to community action*. Thousand Oaks, CA: Sage.

Jimerson, J. B., Cho, V., Scroggins, K. A., Balial, R., & Robinson, R. R. (2018). How and why teachers engage students with data. *Educational Studies*, 1 – 25. doi: 10.1080/03055698.2018.1509781

Jimerson, J. B., Cho, V., & Wayman, J. C. (2016). Student-involved data use: Teacher practices and considerations for professional learning. *Teaching and Teacher Education, 60*, 413 – 424.

Jimerson, J. B., & Reames, E. B. (2015). Student-involved data use: Establishing the evidence base. *Journal of Educational Change, 16*(3), 281 – 304.

Kamins, M., & Dweck, C. (1999). Person versus process praise and criticism: Implications for contingent self-worth and coping. *Developmental Psychology, 35*(3), 835 – 847.

Kennedy, B. L., & Datnow, A. (2011). Student involvement and data-driven decision making: Developing a new typology. *Youth & Society, 43*(4), 1246 – 1271.

Langford, D. P. (2014). *Tool time for education: Choosing and implementing quality improvement tools*. Molt, MT: Langford International, Inc.

Leahy, S., Lyon, C., Thompson, M. & Wiliam, D. (2005). Classroom assessment: Minute-by-minute and day-by-day. *Educational Leadership, 63*(3), 18 – 24.

Lewin, G. (1948). *Resolving social conflicts: Selected papers on group dynamic by Kurt Lewin.* New York, NY: Harper & Brothers Publishers.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry.* Beverly Hills, CA: Sage.

Mandinach, E. B., Jackson, S. S. (2012). *Transforming teaching and learning through data-based decision making.* Thousand Oaks, CA: Corwin Press.

Marsh, J. A., Farrell, C. C., & Bertrand, M. (2016). Trickle-down accountability: How middle school teachers engage students in data use. *Educational Policy, 30*(2), 243 – 280.

Marzano, R. J. (2007). *The art and science of teaching: A comprehensive framework for effective instruction.* Alexandria, VA: Association for Supervision and Curriculum Development.

Mason, L. H., Harris, D. R., & Graham, S. (2011). Self-regulated strategy development for students with writing difficulties. *Theory Into Practice, 50,* 20 – 27.

McCutcheon, G. & Jung, B. (1990). Alternative perspectives on action research. *Theory Into Practice, 29*(3), 144 – 151.

Meece, J. L., Anderman, E. M., & Anderman, L. H. (2006). Classroom goal structure, student motivation, and academic achievement. *Annual Review of Psychology, 57*, 487 – 503.

Meece, J., & Holt, K. (1993). A pattern of analysis of students' achievement goals. *Journal of Educational Psychology, 85*(4), 582 – 590.

Morgan, D. L. (2014). *Integrating quantitative and qualitative methods: A pragmatic approach.* Thousand Oaks, CA: Sage.

Mueller, C. M. & Dweck, C. S. (1998). Praise for intelligence can undermine children's motivation and performance. *Journal of Personality and Social Psychology, 75*(1), 33 – 52.

Nagy, W. & Townsend, D. (2012). Words as tools: Learning academic vocabulary as language acquisition. *Reading Research Quarterly, 47*(1), 91 – 108.

Neves, J. S., & Nakhai, B. (1993). The Baldridge Framework for teaching total quality management. *Journal of Education for Business, 69*(2), 121 – 125.

Nicholls, J. G. (1979). Quality and equality in intellectual development: The role of motivation in education. *American Psychologist, 34*(11), 1071 – 1084.

Park, S., Hironaka, S., Carver, P., & Nordstrum, L. (2013). *Continuous improvement in education.* Stanford, CA: Carnegie Foundation for the Advancement of Teaching.

Patton, M. Q. (2015). *Qualitative research & evaluation methods*. Thousand Oaks, CA: Sage.

Paunesku, D., Walton, G. M., Romero, C., Smith, E. N., Yeager, D. S., & Dweck, C. S. (2015). Mind-set interventions are a scalable treatment for academic underachievement. *Psychological Science, 26*(6), 784 – 793.

Pintrich, P. R. (2000). The role of goal orientation in self-regulated learning. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), *The handbook of self-regulation* (pp. 451 – 502). San Diego, A: Academic Press.

Pintrich, P. R. (2003). A motivational science perspective on the role of student motivation in learning and teaching contexts. *Journal of Educational Psychology, 95*(4), 667 – 686.

Pintrich, P. R. (2004). A conceptual framework for assessing motivation and self-regulated learning in college students. *Educational Psychology Review, 16*(4), 385 – 407.

Pintrich, P. R., & Garcia, T. (1991). Student goal orientation and self-regulation in the college classroom. In M. L. Maehr & P. R. Pintrich (Eds.) *Advances in motivation and achievement: Goals and self-regulatory processes* (Vol. 7, pp. 371 – 402). Greenwich, CT: JAI Press.

Robins, R. W., & Pals, J. L. (2002). Implicit self-theories in the academic domain: Implications for goal orientation, attributions affect, and self esteem change. *Self and Identity, 1*(4), 313 – 336.

Schildkamp, K., Lai, M. K., & Earl, L. M. (2013). *Data-based decision making in education: Challenges and opportunities.* New York, NY: Springer.

Scriven, M. (1967). The methodology of evaluation. In R. W. Tyler, R. M. Gagne, & M. Scriven, (Eds.), *Perspectives of curriculum evaluation* (Vol. 1, pp 39 – 83). Chicago: RAND.

Seifert, T. (2004). Understanding student motivation. *Educational Research, 46*(2), 137 – 149.

Short, D. J., Fidelman, C. G., & Louguit, M. (2012). Developing academic language in English language learners through sheltered instruction. *TESOL Quarterly, 46*(2), 334 – 361.

Smith, J. L. (2004). Understanding the process of stereotype threat: A review of meditational variables and new performance goal directions. *Educational Psychology Review, 16*(3), 177 – 206.

Stiggins, R., & Wiggins, G. (2005). Using student-involved classroom assessment to close achievement gaps. *Theory into Practice, 44*(1), 11 – 18.

Sue, V. M., & Ritter, L. A. (2016). *Conducting online surveys.* Los Angeles: Sage.

Sugai, G., Horner, R. H., Dunlap, G., Hieneman, M., Lewis, T. J., Nelson, C. M., et al. (2000). Applying positive behavior support and functional behavioral assessment in schools. *Journal of Positive Behavior Interventions, 2*(3), 131 – 143.

Taft, R., & Mason, L. H. (2010). Examining effect of writing interventions: Spotlighting results for students with primary disabilities other than learning disabilities. *Remedial and Special Education, 32*(5), 359 – 370.

Tall, D. (1994). *A versatile theory of visualization and symbolization in mathematics*. Paper presented at the Plenary Presentation at eh le? Commission Internationale pour l'Etude et l'Amelioration de l'Ensignemente des mathematiques, Toulouse, France.

Thacker, G. (2018). [Student involved data use survey]. Unpublished raw data.

Townsend, D., Filippini, A., Collins, P., & Biancarosa, G. (2012). Evidence for the importance of academic word knowledge for the academic achievement of diverse middle school students. *The Elementary School Journal, 112*(3), 497 – 518.

U. S. Census Bureau (2017). *New census bureau population estimates shows Dallas-Forth Worth-Arlington has largest growth in the United States.* Retrieved from https://www.census.gov/newsroom/press-releases/2018/popest-metro-county.html

U.S. Department of Education. (2011). *Race to the top assessment program.* Retrieved from https://www2.ed.gov/programs/racetothetop-assessment/awards.html

Van Velzen, J. H. (2013). Educational researchers and practicality. *American Educational Research Journal, 50(*4), 789 – 811.

White, B. Y. & Fredericksen, J. R. (1998). Inquiry, modeling, and metacognition: Making science accessible to all students. *Cognition and Instruction, 16*(1), 3 – 118.

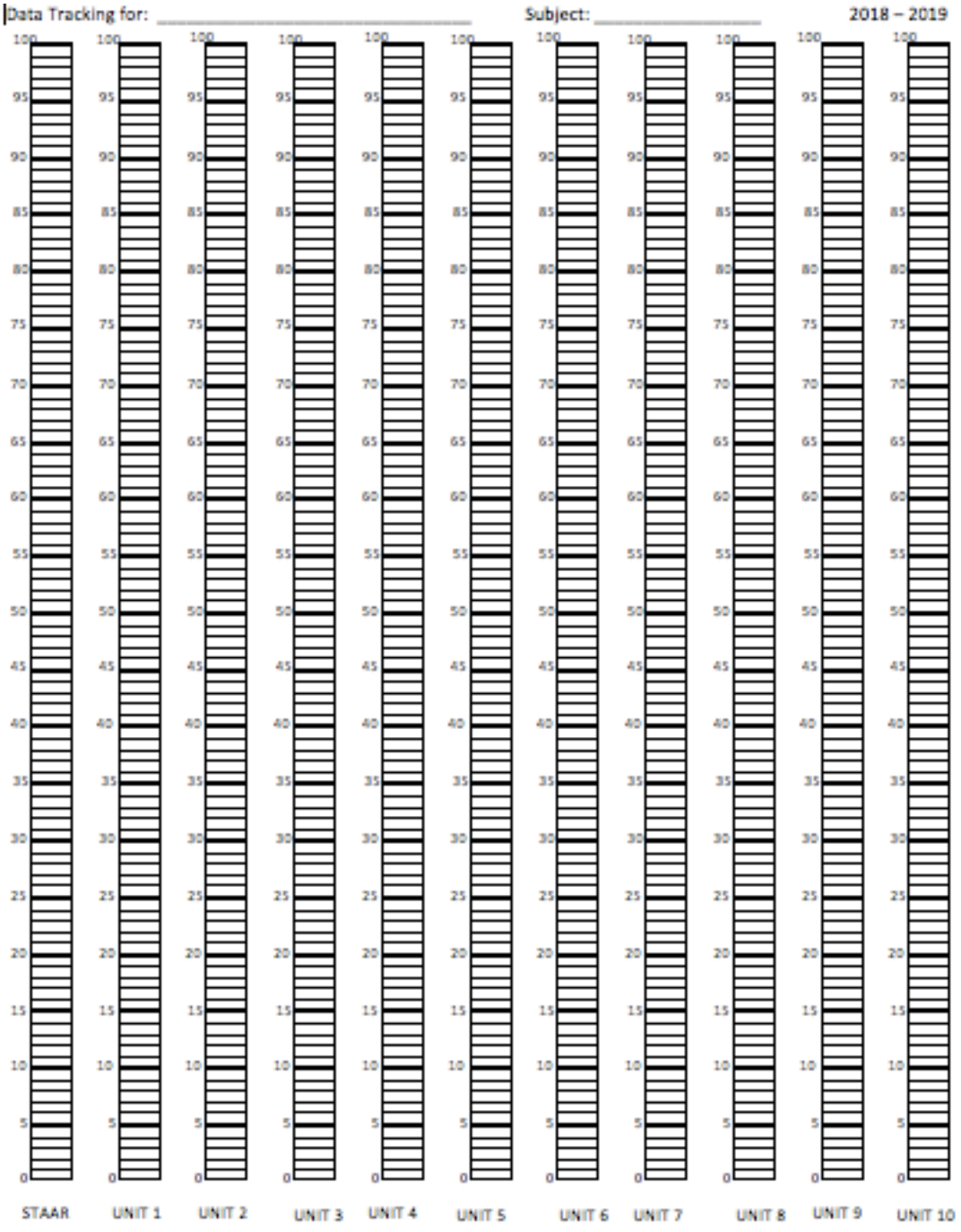
Wiliam (2011). *Embedded formative assessment*. Bloomington, IN: Solution Tree Press.

Yeager, D. S., Romero, C., Paunesku, D. (2016) Using design thinking to make psychological interventions ready for scaling: The case of the growth mindset during the transition to high school. *Journal of Educational Psychology, 108*(3), 374 – 391.

Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. *Theory into Practice, 41*(2), 64 – 70.

APPENDIX A

STUDENT INVOLVED DATA USE USING UNIT TEST GRADES



APPENDIX B

STUDENT INVOLVED DATA USE USING TEKS FROM UNIT TESTS

Algebra 1 Unit 1 Equations and Inequalities TEKS- %

TEKS	Question #	# Correct/Total	% Total
A.5A (R) Solve liner equations in one variable	2, 5, 7 9, 13, 17		
A.12E (S) Solve literal equations	3, 15		
A.5B (S) Solve linear inequalities	4, 10, 16		
A.10A (S) Add and subtract polynomials	1, 6, 11		
A.10B (S) Multiply polynomials	14, 18		
A.10D (S) Rewrite polynomials	8, 12		

Strengths based on the data:

Weaknesses based on the data:

APPENDIX C

STUDENT INVOLVED DATA USE LEARNING TRACKER

Relationships in Two Variables **Unit 6 – 8**										I got it! **NY** Not Yet
I Will…	Graph points with ordered pairs with **whole numbers and integers** (+ and -)	Graph points with ordered pairs with **decimals** (+ and -)	Graph points with ordered pairs with **fractions** (+ and -)	Identify independent and dependent from **tables**	Identify independent and dependent from **graphs**	Write an equation that represents independent and dependent from a **table**	Represent a given situation using **verbal descriptions**	Represent a given situation using **tables**	Represent a given situation using **graphs**	Represent a given situation using **equations**
	11A	11A	11A	6A	6A	6B	6C	6C	6C	6C

Reflections on learning **during** the Unit:

11A - Graph points:
6A – Identify Independent/Dependent:

6B - Write equation from independent/dependent:
6C - Represent situation using table, graph, equation, words:

Reflections on Learning **at the end** of the Unit:

I am really good at…

_____

_____

I need to continue working on…

_____

_____

My goals and plan for improving:

_____

_____

_____

_____

APPENDIX D

STUDENT INVOLVED DATA USE (SIDU)
Guidelines for Implementation

Preparing for the Intervention:

1. Select one of your 6th grade classes for implementation and use of the SIDU intervention.
2. Use the intervention during the entire three-week Unit 6-8, Relationships in Two Variables, at least 3 times per week.
3. Use at least two assessments per tracking day on any of the provided formative assessment questions for students to answer or any of your own to assess the specific standards in Unit 6-8. These can be presented to students on the projector or on a separate sheet of paper. Students may solve or answer these questions on paper or on a whiteboard. Students may also compare answers and discuss with each after solving prior to you going over and discussing correct answers.

Preparing your students for the Intervention:

1. Provide students with a copy of the SIDU tracking document and an overview of the document for the unit. Be sure to include:
    - Reference to and a discussion of the standards you will be covering in unit 6-8 on the SIDU document. Briefly explain and go over what students will learn on each of the standards. Exposing students to the language of the standards is important, so do not omit this part.
    - An explanation of how students will track their learning on assessments. They will shade in the boxes when they get an assessment correct, and then enter in NY for not yet for those they do not. Explain that they can "shade over" the NY when they get it right next time. Remind them that they should have a growth mindset and that just because they don't get an assessment correct, you know they will eventually. That's why you are using NY for not yet. Tell students that this is a document for them to assess themselves and think about what they need to improve upon.
    - An explanation that when they miss problems, you'd like for them to reflect in the boxes at the bottom about this. Modeling this for students on the first few assessments is highly recommended so that students understand how to reflect on their own learning.
    - An explanation of how they will be reflecting on their overall learning at the end of the unit so that they will be able to identify what they need to work on and set goals for improving.
    - An explanation of where they should keep the document for ease of retrieval and daily use.

During the Intervention:

1. Present at least two assessment questions to students per day (minimum of 3 days per week).
2. As students are solving problems or answering questions, circulate throughout the room and provide feedback on effort and strategies, but not on correctness or incorrectness of questions.
3. Prior to providing correct answers: ask questions of students, allow students to discuss their answer with a peer and discuss, or discuss strategies and solutions as a group. Then provide the correct answer.
4. Have students shade in or put NY on the chart. Make sure student does this for the correct standard on the chart. You will have to help them to know which part of the standard they are assessing since they are broken up.
5. Have students who struggled or missed a problem reflect on their learning in the boxes at the bottom of the chart. Examples: "When graphing points with fractions, I need to pay attention to what numbers the fraction is in between." "When identifying independent and dependent from a graph, I need to make sure I am thinking about the x and y axis."
6. At the end of the unit and before the unit assessment, on the back of the document have students identify their strengths and weaknesses and state what they are going to do to improve on areas they need to work on.

APPENDIX E

IRB APPROVAL

DIVISION OF RESEARCH

TEXAS A&M UNIVERSITY

APPROVAL OF RESEARCH
Using Expedited Procedures

February 22, 2018

Type of Review:	Submission Response for Initial Review Submission Form
Title:	Student Involved Data Use using Formative Assessments in Secondary Math
Investigator:	Radhika Viruru
IRB ID:	IRB2018-0107D
Reference Number:	071108
Funding:	None
Documents Approved:	IRB Application 1.3 Informed Consent - Thacker 3.0 Observation Guidelines - Thacker 1.0 Focus Group Guide - Thacker 1.0 Survey Form 2.0 Recruitment Email - Thacker 1.0 Survey Form Questions â?? Glenda Thacker 1.0 Recruitment Email - Thacker 1.0 Survey Form Questions â?? Glenda Thacker 1.0 Survey Form Questions â?? Glenda Thacker 1.0
Special Determinations:	None
Risk Level of Study:	Not Greater than Minimal Risk under 45 CFR 46 / 21 CFR 56
Review Category:	Category 7: Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation,

	identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies

Dear Radhika Viruru:

The IRB approved this research from 02/22/2018 to 02/21/2019 inclusive.

It is recommended that you submit your next continuing review by 01/21/2019 to avoid a lapse in approval. Your study approval will end on 02/21/2019.

Your study must maintain an **approved status** as long as you are interacting or intervening with living individuals or their identifiable private information or identifiable specimens.

Obtaining identifiable private information or identifiable specimens includes, but is not limited to:

1. using, studying, or analyzing for research purposes identifiable private information or identifiable specimens that have been provided to investigators from any source; and
2. using, studying, or analyzing for research purposes identifiable private information or identifiable specimens that were already in the possession of the investigator.

In general, OHRP considers private information or specimens to be individually identifiable as defined at 45 CFR 46.102(f) when they can be linked to specific individuals by the investigator(s) either directly or indirectly through coding systems.

If you have any questions, please contact the IRB Administrative Office at 1-979-458-4067, toll free at 1-855-795-8636.

Sincerely,
IRB Administration

APPENDIX F

IRB CONTINUING REVIEW OF RESEARCH APPROVAL

DIVISION OF RESEARCH

TEXAS A&M UNIVERSITY

APPROVAL
CONTINUING REVIEW OF RESEARCH
Using Expedited Procedures

January 07, 2019

Type of Review:	IRB Continuing Review Form
Title:	Student Involved Data Use using Formative Assessments in Secondary Math
Investigator:	Radhika Viruru
IRB ID:	IRB2018-0107D
Reference Number:	086029
Funding:	
Documents Approved:	IRB Continuing Review Form - (Version 1.0)
Special Determinations:	Written consent in accordance with 45 CF 46.116/ 21 CFR 50.27
Risk Level of Study:	Expedited

Dear Radhika Viruru:

The IRB approved the continuing review of this research on 01/07/2019.

It is recommended that you submit your next continuing review by 12/06/2019 to avoid a lapse in approval. Your study approval will end on 01/06/2020.

Your study must maintain an approved status as long as you are interacting or intervening with living individuals or their identifiable private information or identifiable specimens.

Obtaining identifiable private information or identifiable specimens includes, but is not limited to:

1. using, studying, or analyzing for research purposes identifiable private information or identifiable specimens that have been provided to investigators from any source; and

2. using, studying, or analyzing for research purposes identifiable private information or identifiable specimens that were already in the possession of the investigator.

In general, OHRP considers private information or specimens to be individually identifiable as defined at 45 CFR 46.102(f) when they can be linked to specific individuals by the investigator(s) either directly or indirectly through coding systems.

If you have any questions, please contact the IRB Administrative Office at 1-979-458-4067, toll free at 1-855-795-8636.

Sincerely,
IRB Administration

APPENDIX G

EMAIL SOLICITATION FOR COMPLETION OF VOLUNTARY SURVEY

Math Teachers,

As many of you know, I am working on research to complete my Ed.D at Texas A & M. As part of this work, I have created a survey to collect data on how teachers currently involve students in their own data in the classroom. The survey is voluntary, confidential, and anonymous. If you choose to complete the survey, your name and identity will not be revealed and your responses will only be used to inform the study moving forward. The survey consists of 6 questions and should take no longer than 20 minutes to complete. If you have any questions regarding the survey, please contact me.

Here is the link to the survey: Student Involved Data Use Survey

Thank you,

Glenda Thacker
Curriculum Coordinator Mathematics

Curriculum and Academics
Office (830) 221-2146
Address 1404 IH 35 North, New Braunfels, TX 78130
Email glenda.thacker@comalisd.org
Website www.comalisd.org

APPENDIX H

INFORMED CONSENT DOCUMENT

Title of Research Study: Student Involved Data Use using Formative Assessments in Secondary Math

Investigator: Glenda Thacker

Supported By: Texas A & M University

Why are you being invited to take part in a research study?

You are being asked to participate because you are a 6th grade math teacher in Comal ISD.

What should you know about a research study?

- Someone will explain this research study to you.
- Whether or not you take part is up to you.
- You can choose not to take part.
- You can agree to take part and later change your mind.
- Your decision will not be held against you.
- You can ask all the questions you want before you decide.

Who can I talk to?

If you have questions, concerns, or complaints, or think the research has hurt you, talk to the research team at Glenda Thacker 512-757-2298, Glenda.thacker@comalisd.org or Dr. Julie Singleton at 979-845-8384, jsingle@tamu.edu

This research has been reviewed and approved by the Texas A&M Institutional Review Board (IRB). You may talk to them at at 1-979-458-4067, toll free at 1-855-795-8636, or by email at irb@tamu.edu., if

- You cannot reach the research team.
- Your questions, concerns, or complaints are not being answered by the research team.
- You want to talk to someone besides the research team.
- You have questions about your rights as a research participant.
- You want to get information or provide input about this research.

Why is this research being done?
The purpose of this research is to determine the current extent of, and different ways, in which teachers are having their students track their own data in Comal ISD secondary math classrooms and contrast it with the benefits or limitations of students tracking data on formative assessments as viewed by their teachers in lieu of current practices.

Teachers currently have students track various types of data such as test grades, percentages correct on tests for grade level standards (TEKS), and warm-ups. The research will first determine the different ways secondary math teachers in Comal ISD have students track their own data as well as determine to what extent teachers are implementing this practice. This will be contrasted, through the lens of the teacher, with the benefits and implications of a student-involved data use intervention where teachers have students track data using frequent formative assessments.

How long will the research last?

We expect that you will be in this research study for 6 months.

How many people will be studied?

We expect to enroll about 5 – 8 people in this research study at this site.

What happens if I say "Yes, I want to be in this research"?

The following procedures will be performed for this study:

Procedure	***Description***	***Maximum Length of Time***	***Window for Procedures***	***Where the Procedure Will Take Place***	***Interactions with Others***
Voluntary Survey of Comal ISD Secondary Math Teachers	Teachers will be asked to participate in an online survey and answer questions about their current student-involved data use practices	*20 minutes*	*April and May, 2018*	*Participant choice on personal computer*	*None*

Procedure	***Description***	***Maximum Length of Time***	***Window for Procedures***	***Where the Procedure Will Take Place***	***Interactions with Others***
Classroom Observations	Teachers implementing the intervention in their classrooms will be observed 1 – 2 times during implementation	*1 to 2 hours*	*Spring Semester, 2019*	*Teacher's Classrooms*	*Glenda Thacker*
Document Collection	*Collection of Sample Documents using the procedure*	*15 minutes*	*Spring Semester, 2019*	*Teacher's Classrooms*	*Glenda Thacker*
Focus Group	Teachers participating in the study will participate in a focus group session regarding insights about the intervention	*1 to 2 hours*	*Spring Semester, 2019*	*Location in Comal ISD agreed upon by the focus group*	*Other teachers participating in the study and Glenda Thacker, who will facilitate*

All of the research will be done in Comal ISD and interactions will occur with fellow teachers and with Glenda Thacker. The research will begin with a survey at the end of the spring semester of 2018 and end with a focus group in the spring of 2019.

What happens if I do not want to be in this research?

You can leave the research at any time and it will not be held against you.

What happens if I say "Yes", but I change my mind later?

You can leave the research at any time and it will not be held against you.

Will being in this study help me in any way?

We cannot promise any benefits to you or others from your taking part in this research. However, possible benefits are to deepen your understanding of student involved data use and formative assessments which may benefit your students' learning.

What happens to the information collected for the research?

Efforts will be made to limit the use and disclosure of your personal information, including research study and other records, to people who have a need to review this information. We cannot promise complete privacy. Organizations that may inspect and copy your information include the TAMU HRPP/IRB and other representatives of this institution.

Your signature documents your permission to take part in this research.

Signature of subject	Date
Printed name of subject	
Signature of person obtaining consent	Date
Printed name of person obtaining consent	

APPENDIX I

FOCUS GROUP GUIDE

Purpose of Focus Group	I am collecting this data as part of a field-based case study to analyze a student-involved data use intervention using formative assessments in order to determine its viability and to inform suggested modifications in the future.
Right to Refuse Answering Questions	The questions I will ask will allow me to gain insight into the practices of involving students in their own data using formative assessments in order to explore its use in the future and modifications that may need to occur. You may refuse to answer any questions for any purpose, and you do not need to share with me the reasons for not answering those questions. Do you understand that agreeing to participate in the focus group does not mean you must answer all questions?
Anonymity	Your names or the campus you are on will not be revealed. The final report will refer to you as a sixth grade teacher with the number of years of experience you have and will describe the demographics of your campus. Your responses will only be used to inform ideas for involving students in tracking their own learning data in the future. Please take your time answering questions and answer as accurately as you are able to. Please ask me to clarify any questions you do not fully understand.
Agreement to Participate	Do you agree to participate in this focus group interview? Responses: Teacher 1: _____Yes _____No Teacher 2: _____Yes _____No Teacher 3: _____Yes _____No Teacher 4: _____Yes _____No Teacher 5: _____Yes _____No
1. How did the first day of the SIDU intervention go for you and your students?	
2. Did you see any benefits to students while using the SIDU intervention?	
3. Were there any benefits to you as a teacher in using the SIDU intervention?	
4. Do you feel there were any negative outcomes for students using the SIDU intervention?	
5. What difficulties did you, as a teacher, experience when using the SIDU intervention during the unit?	
6. What difficulties did students have with using the SIDU intervention?	
7. If you decided to use this SIDU intervention, what changes or modifications would you make to the actual tracking document?	
8. If you decided to use this SIDU intervention, what changes or modifications would you make to the processes used in the classroom?	
9. If you decided to use this SIDU intervention, what support would you need from administrators?	
10. Do you feel it is more beneficial for students to track their learning on TEKS, or their grades, or both? Why?	