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The Influence of Written Formative Feedback on Student Learning in Elementary Mathematics

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COLLEGE OF EDUCATION

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2016

Abstract

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Sharon Faye Shrum

MA, West Virginia University, 2001

BA, Shepherd University, 1998

Doctoral Study Submitted in Partial Fulfillment

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Abstract

Research has shown that giving quality feedback to students, which is an aspect of formative assessment, is a high-yield strategy that educators can use to advance academic achievement and support students in their learning process. The study took place in a Virginia school division where formative assessment was not a division-wide initiative used to increase student achievement. Therefore, the purpose of this qualitative case study was to identify the perceptions of teachers and students concerning formative feedback and distinguish the types of written feedback that may influence student learning. Bandura's social cognitive theory of self-efficacy and motivation provided the conceptual framework for this study. Teachers' and students' perspectives and student work samples were analyzed to determine the types of feedback that influenced students' learning in mathematics and to gain an understanding of teachers' and students' perceptions of written formative feedback. Data were collected through interviews with 10 elementary teachers and 20 elementary third through fifth grade students at 2 elementary schools and by collecting 318 work samples of these students. Themes emerged from inductive coding, and teachers' feedback was categorized using a feedback typology to determine the types of feedback teachers gave students. The teachers' and students' understanding of written formative feedback varied but both groups found written descriptive feedback aligned with learning outcomes were most beneficial. The results could serve to improve professional development for teachers on formative feedback, which could increase student learning.

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Dedication

I dedicate this and all that I do to God; He leads me up mountains and gives me the strength that I need to overcome them. He opens up doors that I could not have dreamt of, and He leads the way. He supported me and always listened to me when I thought the mountain was too big to climb. He knew I could do it even when I had doubts. Above all, He planned for this day to happen long before I ever dreamed of it.

To my husband, Robbie, for the support and time that he gave me over the past few years; he knew how much I wanted this and supported me throughout the process.

To my beautiful children, Desereé, Shelbi, and Robbie, for their support; they gave me the internal strength to persevere and never give up without saying a word. They are my inspiration, my dedication, my internal drive, my life, and my blessings from God.

To my parents, and all five of my brothers (Rick, Steven, Jimmy, Eddie, and Roho), and two sisters (Pam and Becky), each who have taught me many things, and most of all encouraged me to do what makes me happy and to do it well.

This dissertation is dedicated to all students in the hope that your teachers will understand the impact they have on you each day, and that you will understand the impact you have on them each day.

Finally, I dedicate this research and work to every person who has dropped out of high school—never let your mistakes define you; always strive for what you know you can achieve.

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Shepherd University, West Virginia University, and Walden University all have rich, rigorous programs that pushed me to be a leader in the world of education, and the many dedicated professors in each of these three schools changed my life.

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Section 1: The Problem

Introduction

For over 40 years, researchers have been interested in how different types of feedback from adults influence children's actions. In particular, the focus has been on the impact of praise and criticism (Dweck, 2007; Schunk, 1982, 1983; Wiliam, 2011). Scholars have conducted minimal research on the effects of descriptive and evaluative feedback on student achievement in the area of elementary mathematics. This study focused on different types of formative feedback from elementary teachers and their impact on student achievement.

This study was based on Gipps, McCallum, and Hargreave's (2004) case study on overall effective teaching in elementary schools. The Gipps et al. study was expanded to include a broad spectrum of the elements of a good primary school teacher and focused on numerous components of teaching and learning, including feedback and formative assessment. Their study, like many other studies and articles, indicated that there is a correlation between teacher comments and student achievement.

The Gipps et al. (2004) case study described feedback to determine best practices and strategies that increased student achievement. Their study described best practices included within a range of teaching and assessing methods with an emphasis on feedback given to elementary students. Gipps et al. created a Feedback Typology Chart (FTC) describing the different types of feedback given to elementary students. Gipps et al. conducted follow-up interviews with the students to understand how they perceived

feedback; however, they did not study the influence of students' perception of feedback on student achievement.

Therefore, a case study using the FTC was used to determine the influence of formative feedback on student achievement in elementary mathematics. The original FTC was created by Gipps and Tunstall (1996a); this tool was revised in 2004. The revised FTC was used in the current study to determine types of feedback on written mathematics formative and summative assessments in order to ascertain the influence of feedback on student learning.

Formative feedback is one of the most powerful influences on student learning (Hattie & Timperley, 2007; Wiliam & Black, 1998b). There are over 40 years of research to support this idea (Gardner, 1991; Hattie & Gan, 2011; Kluger & DeNisi, 1996; Lamberg, 1980; Ramaprasad, 1983; Wiliam, 2011). Motivation is one of the positive effects of giving students feedback (Lipnevich & Smith, 2009). Research confirms that when students are given descriptive feedback about their work and allowed to make changes based on that feedback, their performance improves (Heritage, 2010; Wiliam, 2011). However, research has also shown that the wrong type of feedback can have a negative effect on student learning (Hattie & Timperley, 2007; Kluger & DeNisi, 1996; Ramaprasad, 1983; Wiliam, 2011). Hattie and Timperley's (2007) research revealed that students receive minimal quality feedback from teachers. In fact, Wiliam (2011) and Hattie and Timperley (2007) stated that the average student receives only seconds per day of descriptive comments from teachers.

Sadler (1989) contended that teachers should understand students' strengths and weaknesses so that they can ensure that the comments they provide to students will yield higher motivation and student achievement (Hattie & Timperley, 2007). Sadler then added to Ramaprasad's (1983) definition of formative feedback and stated that specific conditions must be in place for effective feedback to close achievement gaps in scores. The learner must be able to understand the goal, compare his or her current understanding with the goal, and then take the necessary steps that lead to an understanding that matches the goal of what was to be learned (Sadler, 1989).

Butler (1988) uncovered the idea that feedback must be aligned to the learning goal and revealed to students in order to have an impact on student understanding. Butler communicated that feedback such as grades causes no significant gain in student achievement. A surprising conclusion of Butler's study was that comments and grades have even less effect on student learning than giving feedback. Butler found that adding comments to the grade had an adverse effect on student achievement due to what Kluger and DeNisi (1996) referred to as *ego-involving feedback*. This type of feedback—grades, scores, marks, stickers, or comments like "good job" and "well done"—leads to students comparing themselves to others, not to the goal of the lesson (Wiliam, 2011).

Another type of feedback is *task-involving feedback*. This process involves more descriptive feedback and leads to significant gains in student performance (Heritage, 2010; Kluger & DeNisi, 1996; Wiliam, 2011). When they receive task-involving feedback, students know what they need to do to improve and what steps to take in order to enhance their learning (Kluger & DeNisi, 1996; Wiliam, 2011). Descriptive feedback

defines where the learner is and indicates next steps for the student to take in order to improve achievement (Heritage, 2010).

Over the last 40 years, research has been conducted on the teacher's role in formative feedback, though there has been insufficient research on the role of the student in this process (Heritage, 2010; Wiliam, 2011). When feedback is provided by the teacher and aligned to the learning goal, students are more likely to improve their learning if they take action on the descriptive feedback given (Cizek, 2010; Dweck, 2007). The role of the student is essential in the formative assessment process. Cizek (2010) is one of the few researchers in the field of formative assessment who has argued that the student is "the definitive source of formative assessment" (p. 90).

Scholars such as Wiliam and Leahy (2015) and Heritage (2010) have agreed that formative assessment involves providing feedback to students and sharing learning intentions or learning targets related to what students can do. This process allows students to close the gap between what they know and the objective or learning goal. There is insufficient research on the qualities and conditions of self-generated written feedback between the teacher and the student (Cizek, 2010; Wiliam, 2011). Therefore, the effects of specific written feedback on mathematics assessments from the teacher to the student were investigated to determine how teacher feedback influences student learning based on state assessment scores.

The quality of education in America's schools has been a concern for some time (Ravitch, 2010). Assessment practices have been at the forefront of educational discussions and have never been scrutinized throughout the history of learning and

achieving as they are today. High-stakes state testing demands have forced educators to focus on state summative assessments alone, with specific quantitative benchmarks, at the expense of formative assessments, which can assess a student's learning minute by minute (Wiliam, 2011). Therefore, this study was important to show the connection between formative feedback and student learning.

In this chapter, I describe the problems teachers face in ensuring that all students meet state expectations in the area of mathematics assessment as well as the implications of formative assessment. Additionally, I present verification of the initial problem at the local level and from the latest literature. A literature review is included to establish a conceptual framework for this project study and to justify the topic as an issue of scholarly interest. Also included are terms related to this research and a clear rationale, along with limitations of the study and implications.

Definition of the Problem

There is a deficit of teacher training opportunities on the topic of formative assessment through school-based teacher professional development as well as teacher preparation programs (Black & Wiliam, 1998b; Brookhart, 2004; Stiggins, 2004).Thus, a proper understanding of formative feedback is needed to guide teachers toward educationally sound practices for facilitating student learning. Across the northeastern school division in Virginia, the state pass rate goal in mathematics is 75%, and for the last 3 years, the mean pass rate for the division has been 64.54%. There is a need to not only raise achievement rates based on state accountability measures, but also make sure that all students are learning.

Student achievement is the basis of nearly every aspect of education and plays an important role for the state, the district, and the student. *Student achievement* is defined as a student's status in relation to understanding specific subject matter or demonstrating certain skills at any given time (DuFour & Marzano, 2011). Educators associate student achievment with grades and pass rates (DuFour & Marzano, 2011). Conversely, student learning is a concept that is not measured by grades, but rather defined by measuring the effects of teaching strategies (Earl, 2012). The complexities of understanding achievement and learning have been researched by the National Board for Professional Teaching Standards (NBPTS). Based on NBPTS criteria for learning and achievement, teacher and student perceptions play a major role in the definition of achievement and learning (Darling-Hammond, Amrein-Beardsley, Haertel & Rothstein, 2012). This study did not measure achievement, but rather teachers' and students' perceptions of how formative feedback affects student learning. Teacher and student perceptions determine the impact of formative feedback. Therefore, learning is based on the perceptions of teachers and students.

High-stakes summative assessments are federally mandated and do not give students feedback on what they need to learn to meet learning targets. These tests are completed at the conclusion of the school year in most districts and therefore may change teachers' instruction for their next year's students; however, they do not alter instruction for the students who received the scores. Teachers face extreme pressure to meet annual yearly progress based on state assessments. State test scores in reading and math have

dropped over the last few years, despite increased accountability demands from the federal government.

More importantly, the No Child Left Behind Act (NCLB, 2001) called for 100% of the nation's students to reach proficiency in reading and mathematics by 2014 (§ 1111). The objective of 100% of students passing by this deadline did not come to fruition; therefore, pass rates were adjusted. Pass rates continue to be adjusted; furthermore, they have been adjusted for each of the specified subgroups that are being held accountable. Subgroups for accountability are as follows: (a) *Gap Group 1*: students with disabilities, English language learners, and economically disadvantaged students; (b) *Gap Group 2*: Black students only; and (c) *Gap Group 3*: Hispanic students only. Finally, there is a breakdown of other groups, such as Asian students, economically disadvantaged students, limited English proficient students, students with disabilities, and White students (see Table 1).

Overall, the growth percentile reflects that on average across the state, 56.3% of all Grade 5 students assessed in mathematics are doing better than students in Frederick County, Virginia. The growth percentiles range from 18.29% to 59.31%, indicating that 48% to 89% of students across the state are doing better than the students in the district. Furthermore, Virginia's report card shows that Gap Group 1 students did not meet requirements for the last 3 years in all districts. Frederick County's results are lower compared to the state results.

Table 1

Fifth-Grade Mathematics Assessment Scores

School name	APR	AES	BHE	EES	GES	GME	IHE	MTE	OVE	RBR	SES
Title 1 or not Title 1	T1	NT1	T1	T1	NT1	NT1	T1	T1	T1	T1	T1
Total population	488	554	584	535	543	666	379	544	445	676	519
Fifth-grade population	89	88	97	98	95	121	53	95	69	119	86
All students	N/R10	Y/Y-MP	N/R10	N/N	Y/Y	N/R10	N/R10	N/Y	Y/YMP	N/N	N/N
Gap Group 1	N/N	Y/N	N/R10	N/N	N/N	N/R10	N/N	N/R10	N/N	N/N	N/N
Gap Group 2	TS/TS	TS/TS	Y/TS	N/TS	TS/TS	N/TS	TS/TS	TS/TS	TS/TS	N/TS	TS/TS
Gap Group 3	N/N	Y/N	N/Y	N/TS	TS/TS	N/R10	TS/TS	N/TS	N/TS	N/N	N/R10
Asian students	TS/TS	TS/TS	TS/TS	TS/TS	TS/TS	N/TS	TS/TS	TS/TS	TS/TS	TS/TS	TS/TS
Economically disadvantaged	N/N	Y/N	N/R10	N/N	N/Y	N/T10	N/N	N/R10	N/N	N/N	N/N
Limited English proficient	N/TS	Y/N	N/TS	N/Y	TS/TS	N/TS	TS/TS	N/TS	TS/TS	N/N	N/N
Students with disabilities	N/TS	N/TS	N/TS	N/N	N/N	N/R10	N/TS	N/R10	N/TS	N/N	N/N
White	N/Y	Y/Y-MP	N/R10	Y/Y	N/Y	N/R10	N/R10	N/R10	Y/YMP	N/R10	N/N
Student growth percentile	47.69	45.15	43.97	11.81	31.91	31.24	44.97	30.62	43.47	59.42	18.77
Fifth-grade mathematics for 2012/2013	43.58	53.80	52.67	18.29	56.84	30.47	40.13	45.57	45.50	34.58	59.31

Note. Adapted from "School, School Divisions, and State Report Cards," by Virginia Department of Education, 2014 (https://p1pe.doe.virginia.gov/reportcard/). In the public domain.

Wiliams (2011) disclosed that using summative assessment as a tool to decide whether students are successful takes too long; the information comes too late to be useful. The impact of monitoring minute by minute and giving feedback along the way is significant to enhancing student success (Heritage, 2010). Therefore, formative assessment and feedback play a critical role in raising students' levels of achievement.

There is a direct connection between the teacher's role in formative feedback and student achievement (Hattie, 2011). However, the impact of written formative feedback on elementary math achievement results has not been researched. Given the decreased mathematics state assessment results over the last 3 years, there is a need to focus on formative assessment and formative feedback to determine whether there is an impact on student achievement in mathematics.

Stiggins (2007) conveyed that the role of assessment has been to identify and feature differences in student learning to rank students according to their achievement. Externally developed assessments (e.g., state assessments) do not meet the defining characteristics of formative assessment, leaving students in a win-or-lose situation, with teachers not having an opportunity to change the outcome after the summative assessment (Stiggins, 2008). Therefore, creating a balance of both formative assessment and summative assessment is necessary to meet the needs of all students (Stiggins, 2008). Both types of assessment serve a particular purpose and should be essential components of teacher training programs to best benefit students, teachers, administration, school divisions, and policy makers (Stiggins, Arter, Chappuis, & Chappuis, 2006).

Formative assessment research has been proven to work for well over 20 years; however, when teachers implement the five strategies suggested by Wiliam (2009) to increase achievement with fidelity, why are students still not meeting benchmarks? Research thus far has focused primarily on the type of feedback provided; little research, if any, has focused on written feedback in elementary mathematics. Therefore, looking at specific feedback using the feedback typology, teacher interviews, and a survey depicting classroom assessment practices gave insight into the impact of formative feedback in elementary mathematics.

Rationale for the Study

Evidence of the Problem at the Local Level

District scores in mathematics have decreased over the last 3 years due to new high-stakes tests that have been modified to have increased rigor. More schools have failed to make progress in math and reading, and increases in the number of schools adhering to state-mandated sanctions have resulted. From 2002 to 2011, the number of schools not making accreditation across the state decreased; however, with increased rigor of the end-of-year assessments beginning in 2011, the number of schools not meeting accreditation standards has increased. Figure 1 depicts the increase in nonaccredited schools. Virginia's Department of Education claimed that increased rigor on all assessments results in new standards, exams, and increased expectations, which lead to higher cut scores, thereby increasing the number of schools that are not fully accredited (Bolling, 2014).

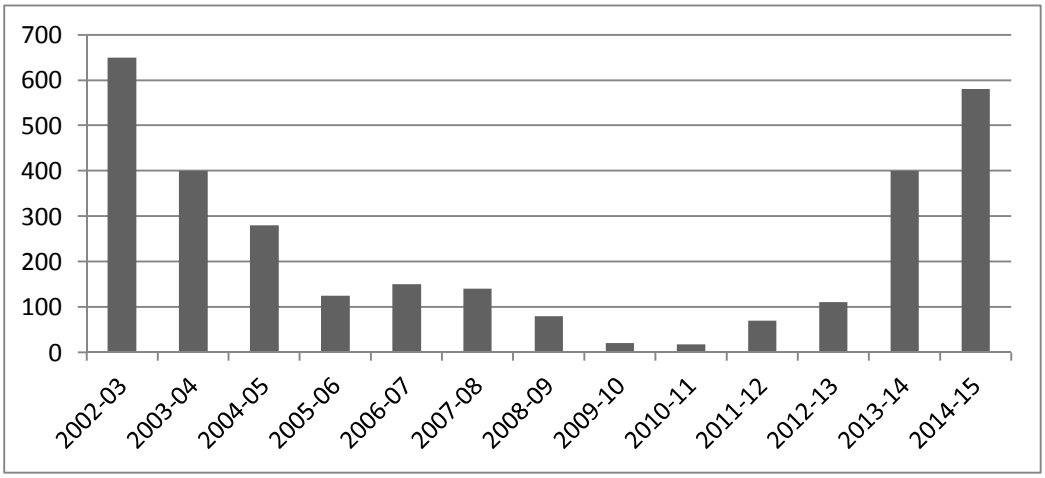

Figure 1. Number of nonaccredited schools in Virginia. Adapted from "School, School Divisions, and State Report Cards," by Virginia Department of Education, 2014 (https://p1pe.doe.virginia.gov/reportcard/). In the public domain.

Our district shows comparable results to other schools, in that more and more schools are finding themselves in warning, focus, or school choice status whereby parents have the opportunity to choose to have their students transported to a school that is making progress. All three situations require change and mandatory sanctions if sufficient progress is not made. For the 2013–2014 school year, six out of the 11 elementary schools in the district were in warning or focus status.

An internal review by the district was conducted, and findings showed that teachers were spending little time giving feedback to students; therefore, the district began building a plan and implemented a model to build capacity for understanding formative assessment throughout the district. A formative assessment committee was formed, and all administrators in the elementary setting were trained on the framework for formative assessment based on the work of Wiliam (2011). Wiliam provided a 1-day professional development opportunity for all K–12 administrators and approximately 40

teachers in July 2013. As with most 1-day professional development opportunities, little changed, and more schools found themselves in warning status.

At the forefront of this situation are teachers. Teachers face many challenges: They are accountable for all students and must meet the benchmarks of high-stakes state assessments while providing adequate education to all children. Teachers must also ensure that all children receive appropriate instruction based on their individual level, regardless of the level at which they enter each grade (Solomon, Lalas, & Franklin, 2006). In elementary school, teachers of Grades 3 through 5 face even more accountability due to high-stakes assessments that are given at the end of the year. However, research has revealed that teachers should be focusing on more than end-of-year assessments and focusing on formative assessments along the way; waiting until the end-of-year assessment is an act of futility (Wiliam, 2011).

One of the five stages of formative assessment that Wiliam (2011) referred to is *self-regulated learners*. When students are self-regulated, they are engaged cognitively and have behaviors that are systematically oriented toward goal attainment (Schunk, 1982). Teachers then have to ask why their students are not making adequate academic progress.

Evidence of the Problem From the Professional Literature

There has been a decrease in standards of learning state mathematics assessment scores over the past 3 years in the district. Schools have been sanctioned per federal legislation requirements by being placed in focus, watch, or warning status. These penalties cause an increase in accountability, and they come with a hefty price tag and

cuts in funding. One of the penalties faced by local schools is an unfunded state mandate requiring the district to hire a state-appointed liaison to provide an internal needs assessment of all of the elementary schools, as well as the schools with focus or warning status. Data collection from the needs assessment determined that formative feedback needed to be closely looked at, along with student expectations. Teacher feedback given to students was referred to as minimal in the state report, and professional development for all stakeholders on formative assessment was suggested.

Feedback can be a negative or positive influence on student learning. When teachers provide students with useful feedback, students became self-motivated and engaged in further learning (Hattie, 2012). However, distinguishing effective feedback from ineffective feedback is the change factor in educators' efforts to promote student learning and was central to this study. A meta-analysis on feedback showed that the effect size of feedback is 0.77 (Hattie & Timperley, 2007). Research revealed that feedback is considered one of the most influential strategies for promoting student learning when used effectively. Subsequently, the type of feedback given and how it is received can cause students to engage, facilitating learning, or can cause students to disengage, impeding learning (Hattie & Timperley, 2007).

This research will be an important contributor to a model of formative assessment and feedback in instruction for the school district and will promote and sustain student learning. The intent and social impact of the study involved identifying research-based evidence regarding the specific types of feedback that may be given to students that promote student achievement. The study will have an impact on teachers, students, and

instruction. If a particular type of written feedback closes the achievement gap in this study, then teachers will be able to adjust the type of feedback they use to improve student learning. This study revealed evidence that specific written feedback benefits students' understanding and may increase student achievement. Finally, overall instructional strategies may change when there is an emphasis on written feedback, specifically on the type of written feedback that promotes learning and closes the gap for students.

There is a need to establish a system that enables teachers to understand what formative feedback is and understand its impact on student achievement. It is necessary to understand both the teachers' views on formative assessment and the students' views on scores or teacher feedback in order to create professional development that supports teachers' understanding of formative assessment. Teachers' perspectives on formative assessment and teachers' formative assessment practices provided an understanding of the types of feedback that may increase student achievement.

Definitions

The following definitions are provided to ensure consistency and understanding of key terms throughout the study. Definitions without citations were developed from the research.

Achievement: A measure of growth between the baseline of student understanding and the content-related goal of the objective (Brookhart, 2008).

Assessment for learning: Teachers using the student assessment results to provide information to students to increase student achievement (Stiggins, 2005).

Assessment of learning: Tests and quizzes at the end of learning summative assessment; (Stiggins, 2006).

Feedback: Consists of information about progress and next steps in the student's learning process (Hattie & Timperley, 2007).

Evaluative feedback: Involves feelings of value or judgment that cause emotion (Gipps et al., 2004).

Choice words: Specific language used by teachers to empower students to become strategic thinkers and have a growth mindset (Johnston, 2004).

Descriptive feedback: Involves knowing expectations and next steps; the teacher describes clear steps that guide students to an understanding that allows them to master the objective (Gipps et al., 2004; Gipps & Tunstall, 1996b).

Formative assessment: A cyclical process, whether written or oral, by teachers and students, that provides information to adjust students' thinking to meet goals or objectives and gives teachers understanding regarding where to insert instruction (Wiliam & Leahy, 2015).

Learning: Gaining knowledge or skills through set learning goals that are taught or experienced, as measured by teacher and student perception (Brookhart, 2012).

Learning targets: A common set of fact-based skills, concepts, or enduring understandings that students are expected to learn (Wiliam, 2011).

Self-efficacy: A belief to successfully achieve an objective or learning goal; an individual's behaviors and feelings that are affected by one's beliefs and determination to take actions or next steps toward learning goals (Bandura, 1977; Bong, 2013).

Summative assessment: Test or quiz that shows how individual students performed or how learning objectives have been mastered at the end of learning (Wiliam, 2011).

Significance of the Study

The effort to examine the impact of specific feedback from elementary school teachers on mathematics formative and summative assessments as well as daily assignments is significant for several reasons. Specifically, written feedback on summative assessments allows dialogue to take place between teachers and students, which can ensure that certain learning goals are achieved and monitored, thereby motivating the student to achieve the learning goal. Finally, determining the type of feedback written on assessments helps teachers to understand the impact and value of this instructional strategy to increase student achievement.

Analyzing written feedback using the Gipps et al. (2004) feedback typology afforded me the opportunity to study the nuances of feedback in relation to formative assessment and academic achievement. By consciously and deliberately focusing on the form, substance, and interpretation of written feedback, this study allowed for an examination of how written feedback impacts academic achievement. The results were used to create and develop a guide to support professional development in the area of formative feedback that may increase student achievement in all content areas.

Research Questions

The guiding research questions for this study were grounded in a review of the literature on assessment and learning. Learners' cognition can influence the direction and

persistence of achievement behaviors (Bandura, 1997; Schunk, 1983).Through research, the implications for teachers directs a further understanding of formative feedback and the type of feedback needed to increase student learning. This study was conducted to understand whether specific formative feedback has an influence on student achievement and to determine teachers' perceptions of giving feedback and students' perceptions of receiving feedback. The main research question was the following: How does formative feedback influence student achievement in elementary mathematics? Subquestions that further guided the research were as follows: (a) What types of feedback are teachers giving students on formative assessments? (b) What are teachers' perceptions of giving formative feedback? and (c) What are students' perceptions of receiving formative feedback?

Review of the Literature

To find relevant literature, I searched Google Scholar, Academic Search Complete, Educational Research Complete, Educational Resource Informational Center, and ProQuest Central. The Boolean search terms I used while searching for related literature included *achievement*, *learning, formative assessment*, *self-efficacy*, *motivation*, *feedback*, *self-regulation*, *ability and effort*, and *assessment for learning*. A research-based foundation including types of written feedback and their connection to student learning in the elementary mathematics classroom was the goal of the literature review. Prior research suggested that teachers' understanding of the process of formative assessment and its purpose is minimal (Boyle & Charles, 2010; Gearhart & Osmundson, 2008; Gearhart et al., 2006; Hattie & Timperley, 2007; Heritage, 2010; Heritage, Jones,

& White, 2010; Heritage, Kim,Vendlinskil, & Herman, 2009; Jones, 2015; Osmundson, Dai, & Herman, 2011). The purpose of this research was to identify what feedback causes students to achieve. The literature review includes the key theoretical arguments that support research into the efficacy of feedback, analysis of prior research relevant to formative assessment, and the impact of feedback as it pertains to elementary school students in mathematics.

Learning and Achievement

Student learning and achievement should occur in a lesson; it may not occur if known goals and formative assessment are not part of the process (Brookhart, 2012). Students learn when teachers create learning targets toward a desired outcome and when teachers monitor students' thinking during the learning process (Brookhart, 2012). When students are aware of what they know and what they need to learn, teachers then can scaffold feedback that allows them to take necessary steps to achieve the set learning outcome. Setting learning targets based on aligned objectives for the student and monitoring formatively throughout the lesson to ensure that the student is making sense of the learning is a cyclical process that makes certain that learning is occurring (Brookhart, 2012; Heritage, 2010; Senko, 2016). Overall, in order for students to learn or achieve a specific goal, they must understand what the goal is and be motivated to achieve it.

Conceptual Framework

In this study, I used Bandura's (1977) self-efficacy theory as the foundational conceptual framework. Self-efficacy theory predicts achievement and performance and

refers to one's capabilities for learning at multiple levels (Schunk & Pajares, 2009; Senko, 2016). Self-efficacy influences almost every aspect of student performance, including motivational and cognitive demand; thus, it is important for educators to understand how students see themselves as learners (Bandura, 1989; Bong, 2013; Ferlazzo, 2015; Hattie, 2012; Senko, 2016). Causing students to be motivated and think about their learning is what Senko (2016) referred to as *achievement goal theory*. Senko argued that students' achievement goals represent their reason for engaging in a learning task.

Self-efficacy has four major components. According to Bandura (1997), the first component is how well one thinks one will do, or one's actual performance. If students believe that they are capable of doing a task, then they are more likely to be successful (Dweck, 2006; Ferlazzo, 2015; Satterfield, 2014). Conversely, one can have too much confidence and overcompensate, resulting in not being successful. The second component consists of various experiences that build self-efficacy. One may compare one's own performance on a task to that of others. In doing so, one may reason, "if my peers can do it, so can I." The third component consists of forms of social persuasion. Social persuasion occurs when others influence one's state of mind by telling one that one can or cannot perform a specific task. Relying on others to build one's own confidence involves social persuasion (Bandura, 1997).

The final component of self-efficacy is referred to as *physiological indexes*. Physiological indexes refer to the emotional state that a person is in while doing a task (Bandura, 1997). The task may cause the person to experience stress or anxiety, which

may, in turn, cause the person to fail. It may also cause the person to overcompensate by believing that he or she is the best at a particular task and that failure is not an option. Educators need to be aware of the multiple components of self-efficacy to ensure that when they are giving formative feedback to students, they understand why students react in a certain way when attempting a task.

If educators can positively influence students' self-efficacy, they can have a positive effect on other outcomes, such as the success of each student's learning. Self-efficacy can predict outcomes for students in the areas of self-regulation, motivation, learning, and achievement (Jones, 2015; Jones, Watson, Rakes, & Akalin, 2012; Jones & Wilkins, 2013). Therefore, achievement and performance are highly correlated to self-efficacy (Bandura, 1997; Jones, 2015; Schunk & DiBenedetto, 2016). Educators may have an interest in self-efficacy if it can predict achievement and enhance learning.

Educators can foster students' self-efficacy by providing challenging tasks for them and providing necessary scaffolds and feedback to ensure that they master objectives (Bandura, 1997; Jones, 2015). Students can build self-efficacy when they are in collaborative group settings and are able to observe one another fail and succeed as they manipulate a task (Jones, 2015). Teachers can encourage students and remind them of their successes through descriptive feedback, and, as a result, build their self-efficacy. Finally, knowing one's students and having a relationship with them helps in understanding the psychological and emotional states, such as anxiety and stress, that some children experience when they believe that they are unable to do a task (Bandura, 1997; Jones, 2015).

Research has shown that when students engage in self-regulated learning (SRL), they are more likely to be successful in school (Butler & Schnellert, 2015). SRL fosters self-efficacy and motivation (Butler & Schnellert, 2015). When students engage in SRL and set goals for themselves, they are more likely to reach their goals because they are using goals as reference points for where they are and what they want to achieve (Butler & Schnellert, 2015).

Motivation

According to Hattie (2012) and Schunk, Meece, and Pintrich (2012), motivation is outcome based; it is not directly observed, but its outcomes can be observed. Goal setting is usually tied to motivation. When students set goals for themselves, they are determining what they want the outcome to be (Schunk et al., 2012). Therefore, motivation can determine how students learn (Schunk et al., 2012). Motivation is also improved when students understand learning targets (Brookhart, 2012; Jones, 2015). When students understand the learning target of a lesson, they will strive to meet the objective by which their learning will be assessed (Brookhart, 2012). Students are then able to set goals for themselves when they receive formative feedback throughout.

Ability and Effort

Schunk (1982) published two studies on the developmental nature of ability and effort. In his first study, he examined whether attributing past accomplishments to the idea of effort promotes perceptions of self-efficacy and enhances achievement. The study used students ranging in age from 7 to 10 in elementary mathematics classrooms. Forty students were administered three 40-minute treatment sessions over 3 consecutive days.

Throughout these 3 days, proctors occasionally commented to each of the students about their efforts, giving evaluative feedback. In this experimental study, the control group did not receive any comments and was not monitored. The students who received feedback regarding past efforts performed significantly better than the other three groups. Schunk (1983) concluded that linking past achievement with student efforts promotes task involvement (student engagement), skill development, and student self-efficacy.

Schunk's study investigated student efforts related to feedback on achievement, and later, he introduced the ability variable into his experiment and used third graders in his investigation (Schunk, 1982). He used three types of feedback and measures, including a self-efficacy component, whereby students were asked to predict their likelihood of success in solving particular math problems on an arithmetic test. Results of the study showed that students who received specific feedback judged themselves the most successful and correctly answered the highest number of posttest problems.

Schunk's (1982) experimental results are interesting in that the combination of effort-related and ability-related feedback had the greatest effect. Similarly, Gipps et al. (2004) studied lower elementary students ages 6–10 in an effort to determine the relationship between feedback types and feedback strategies. Their research focused on teachers and pupils. Results showed that students who received detailed feedback and whose instructors made the effort to suggest ways in which they could improve were more successful in reading content than others who received evaluative or descriptive feedback. Students who received evaluative feedback thought mostly about how well

they were doing—or even worse, how well they were doing compared to everyone else (Beaumont, Doherty, & Shannon, 2011; Kohn, 1993).

Research has shown that learning is most effective when students take control over their learning (National Research Council, 2000). Using a constructivist approach, Bruner (1960) revealed that a theory of instruction should address students' predisposition toward learning, should indicate approaches that best meet learners' needs so that the instruction is understood by the student, should indicate an appropriate sequence of information, and should involve appropriate feedback based on the students' understanding of the information. Hattie (2003a) stated that feedback given to learners should cause students to think. If feedback does not cause thinking, then the feedback was not formative in nature (Hattie, 2006; Wiliam, 2015).

Feedback on daily assignments allows the teacher to reflect on the words that are written and relate the words to the actions the student is taking (Fisher & Frey, 2013; Killion, 2015a). Feedback and reflection is the process of teachers' thinking that occurs during instruction that provides students with the concise steps that moves the student closer to meeting the set goal (Black & Wiliam, 1998a, 2006; Sadler, 1989; Shepard, 2000). Classroom teachers are empowered by using formative feedback during daily lessons through deepening their understanding of continuous formative feedback and seeing students close learning gaps (Killion, 2015b). Teachers are then able to relate the feedback given to student achievement. Feedback is one of the most influential means of increasing student learning and understanding (Fisher & Frey, 2013; Hattie & Gan, 2011; Killion, 2009).

According to Robinson, Myran, Strauss, and Reed (2014), formative feedback from teacher to pupil on a daily basis causes students to be cognitively engaged in their learning. The relationship between educators and students rises to a higher level through this communication process. When students know what to do with daily formative feedback, they understand that the information communicated by teachers to students is intended to modify their thinking (Shute, 2008; Smith, 2013; Watson, 2014).

Nordrum, Evans and Gustafsson (2013) and Wiliam (2011) found that when teachers give students specific feedback on their thinking, the instructional gap closes and students begin to ask more in-depth questions due to having a higher level of cognitive understanding. Nordrum et al. (2013) and Stiggins (2008) stated that students begin to perceive their ability to succeed and control over their learning when they are given descriptive feedback that pertains to their learning. According to Bandura (1993), self-efficacy is an important factor in regulating student motivation. Therefore, the formative assessment process is a necessary component of learning not only to build student understanding of the task, but also to develop a process whereby students become advocates for their education (Wiliam, 2006). This process is meant to provide teachers with accurate data on where to insert instruction and lead teachers to give specific feedback to students on what their next steps are in the learning process.

Teachers need to communicate learning intentions to students so that students can cognitively examine their learning and progress toward the goal (Mehmet & Alev, 2016; Stiggins, 2008). Teachers also need to uphold the belief that ability is incremental rather than permanent in order to increase daily student achievement (Clark, 2012; Wiliam,

2011). Finally, teachers need to converse with students and explain that formative assessment is a process that takes place daily between the teacher and the student, and that it ensures a constant dialogue of written or oral feedback to increase student achievement (Nordrum et al., 2013; Wiliam, 2011). A minimal amount of current research on written feedback on mathematics assessments was uncovered during the literature search.

High-stakes demands have resulted in schools focusing on state assessments at the end of the year (after learning) and missing the opportunity to analyze student results throughout the academic year (during learning) (Wiggins, 2005). Wiliam (2011) referred to this action as the *data-push*, and it results in teachers not understanding how to use data in formative assessments. Moreover, by the time the data are retrieved from the assessment results, the teacher has most likely moved on to the next unit.

Therefore, there is a need to uncover what types of feedback on formative assessments are given to students and how students interpret and apply the feedback in order to the take next steps in their learning to close achievement gaps. Feedback was described by Wiliam (2011) as a strategy that takes place throughout instruction and involves teachers, students, and peers—not solely the teacher. This process sets the stage for students to assess themselves through feedback to understand how to improve their learning (Fyfe et al., 2014; Wiliam, 2009).

In light of significant demands for student achievement and the understanding teachers have in the area of feedback, this study may give teachers an understanding of what role formative assessment has in the classroom and how this tool may offer a way to

plan for next steps and instruction for students. Feedback that includes advice concerning next steps to be taken has been found to be far more effective than feedback that evaluates (Beaumont et al., 2011; Fyfe et al., 2014; Hattie & Timperley, 2007). According to Pelgrim, Kramer, Mokkink, and van der Vleuten (2013) and Wiliam (2011), immediate or efficient timing between the delivery of feedback to students and the time of the assignment or assessment has a high impact on student achievement. Therefore, understanding the specific feedback shared with students is essential to educators; if there is a connection between specific feedback, elapsed time between assessment and feedback, and understanding student perceptions of feedback, then educators will be able to help students reach learning targets more efficiently. Although other researchers have examined the importance of providing students with multiple varieties of feedback, this study was based on types of feedback according to a feedback typology (Gipps et al., 2004). The typology in Table 2 was used to determine the type of feedback given to students on mathematics assessments. The typology of assessment feedback showed the relationship between feedback types and written feedback. The typology describes descriptive or evaluative feedback provided by the teacher.

Research provides evidence that the use of feedback as an instructional strategy is one of the best means of fostering student achievement (Hattie & Timperely, 2007). Hattie (2003b) proclaimed that student self-regulation is more important than feedback that is focused on task performance. Therefore, research on types of specific feedback given to students is needed to increase student achievement.

Table 2

Evaluative and Descriptive Feedback Typology

Evaluative feedback				Descriptive feedback			
A1	A2	B1	B2	C1	C2	D1	D2
Rewarding (positive)	Punishing (negative)	Approving (positive)	Disapproving (negative)	Specifying attainment	Specifying improvement	Mutual construction of achievement	Mutual construction of improvement
Giving rewards	Giving punishment	Expressing approval	Expressing disapproval	Telling children they are right/wrong; describing why the answer is correct; telling children what they have or have not achieved	Specifying or implying a better way of doing something	[e.g. Discussing with children the features of a piece of work]	Getting children to suggest ways they can improve

Note. Feedback Typology Chart (FTC) Adapted from *What Makes a Good Primary School Teacher?* (p. 108), by C. Gipps, B. McCallum, and E. Hargreaves, 2004, New York, NY: RoutledgeFalmer. Copyright 2004 by Gipps, McCallum & Hargeaves. Reprinted with permission.

The feedback that helps learners know what steps are needed to close the learning gap is central to understanding formative assessment (Heritage, 2010). Pepper and Pathak (2008) stated that without feedback, students may not know what their learning goal is and how far or how close they are from their goal. In order to close achievement gaps, Hattie (2003b) and Wiliam (2009) suggested that teachers should provide quality feedback to students throughout learning in order to support significant academic gains.

Current practices and policies that teachers have faced for decades are not in agreement with today's research. State assessment scoring, report card grading, letter grades, and symbols given daily to students are misaligned with effective feedback that increases student learning (Black, 2006; Butler, 1988; Wiliam, 2011). Hattie and Timperley (2007) described feedback as being among the top influences on student achievement.

Hattie's (2012) research revealed feedback as one of the most common characteristics of successful teaching and learning; however, information is missing on what specific feedback from teachers causes students to take the next steps in learning based on the students' perceptions of feedback. Self-efficacy influences almost every aspect of student performance, including motivational and cognitive demand; thus it is important for educators to understand how students see themselves as learners (Bandura, 1989; Bong, 2013; Hattie & Yates, 2013).

Summative Assessments

The federal government's involvement in K–12 education has heightened accountability levels for all states, resulting in high-stakes assessments. Stiggins (2008) noted that the assessment required by the Elementary and Secondary Education Act (ESEA, 2001) has had a profound effect on how assessments are viewed and used within the educational community and

how assessments have become a powerful tool used to change the school's role in the success of all students. This powerful tool, known to teachers as end-of-year state summative assessments, does not seem to be raising student achievement as No Child Left Behind (NCLB) may have expected. Stiggins (2008) and Wiliam (2011) claimed that teachers' demand for summative assessment has increased, and incremental formative assessments are not being utilized to check progress along the way. Heritage (2010) stated that "these are the assessments that count even though they offer little help to teachers in their daily practice" (p. 141).

Accountability and expectations of students, teachers, and school leaders are at an all-time high. The Elementary and Secondary Education Act (ESEA) of 1965, No Child Left Behind (NCLB) of 2001, the revised ESEA of 2012, and now the new Every Student Succeeds Act (ESSA) of 2015 are laws that focus on accountability and high expectations for public educators and students. These laws are to ensure that all public schools receive federal and state funding. The laws were established to ensure all students get an adequate education. However, with these laws, come high demands on schools to perform at a certain rate and receive a targeted score to receive funding.

Schools that have not met the state-set benchmark for academic progress or annual yearly progress have met sanctions from the federal government. Schools have been mandated to provide coaches that lack funding commitment. Finally, recommendations for removal of administration at the school and district level are put in place if progress is not shown.

School take-over by the federal government has also been enforced when a district does not meet accreditation and annual yearly progress. Summative assessment is an assessment of learning (Stiggins, 2008). It can gauge how much students have learned. Its purpose is to assess

achievement for final grades to promote student learning. It is also used to monitor state performance scores. Assessment scores are used to give rewards or punishment for gains and failures. The purpose is to check achievement and to inform state and district stakeholders (Stiggins, 2008). Although there is a high demand for summative assessments research, is clear that formative assessments cause the greatest impact on student achievement (Hattie, 2012).

Formative assessment, then, is an assessment for learning, as referred to by Stiggins (2008). According to Sadler (1989), Hattie and Timperly (2007), and Wiliam (2011), the following questions should be asked by the student: "Where am I going?", "How am I doing?", and "What do I do next?". Teachers should be asking: "What do my students need to know and understand to be ready to meet the state standards or learning targets?" Together, the teacher and student play critical roles in the process of formative assessment.

Although formative assessment is used to inform students of where they are and the next steps needed to attain achievement, it is also used to achieve learning targets that underpin standards. It provides the student and teacher with information about the next steps in the learning process. Therefore, it is the building block that helps build understanding for students. Assessment for learning is then a belief that success is within reach of the student. Brookhart (2012) believed that while teachers have a wealth of strategies to move students in the right direction, the missing component is that students do not have self-regulation strategies to monitor where they are, what is next, and what goal they are trying to reach.

An overlooked purpose of assessment is the use of formative assessment to improve student performance, which supports and encourages learning (Baker, Herman, & Linn, 2006; Stiggins, 2008). Both day-to-day and minute-by-minute feedback from formative assessments

will increase student learning (Wiliam, 2011; Stiggins, 2007). The extensive research of Black and Wiliam (1998a) shows that by applying principles of formative assessment, one can produce gains in student achievement and learning.

Formative Assessments

The major landmark of research conducted by Black and Wiliam (1998a) concluded that formative assessment was amongst the educational strategies causing the greatest impact on student achievement. Research suggests that for most teachers in the United States, a formative assessment is when the teacher uses student assessment results to change his or her instruction. However, there is a more sophisticated view of formative assessment that will be a paradigm shift in teachers' thinking; that is, to add the student's role in this process and the need to adjust their current learning tactics (Keeley, 2015; Popham, 2010). Therefore, a change in the process and the learning relationship between teacher and student needs to take place, where teachers use assessment results to shape their teaching and students use assessment results to develop their learning tactics and procedures (Popham, 2010).

With an emphasis on the end-of-year summative assessments, rather than on day-to-day student learning, schools may be waiting too long to intervene (Keeley, 2015; Killion, 2015a; Wiliam, 2011). With the increased demands of NCLB in 2001 to ensure that all students pass the state assessment, more time is spent understanding where the student is academically and where the student needs to be. Therefore, formative assessment has been one of the most important topics in Frederick County Public Schools.

Research findings present a positive correlation between formative assessment and student achievement. Short-term benefits are students monitoring their learning, student

motivation, and increased assessment scores (Wiliam et al., 2004). Summative assessments occur at the end of learning and gauge student learning against the standard. Generally, teachers do not provide formative assessment practices with summative assessments. Formative assessment techniques, such as feedback, occur during the learning process, thereby causing a relationship between formative assessment and student achievement (Black & Wiliam, 1998a; Wiliam, 2011).

Wiliam (2011) explained that the formative assessment process involves the teacher, the learner, and peers. The role of the learner is for the student to become an owner and advocate for his learning (Wiliam, 2011). Wiliam stated that in the course of a year, the rate of learning in the classrooms where teachers implemented strategies for formative assessment (feedback, clarifying and sharing learning intentions, and activating students as owners of their learning) will nearly double compared to other classrooms.

Assessments are at the peak of educational discussions due to the increase in assessments that students take each year. Formative, summative, daily, and minute-by-minute assessments are all a part of a student's day. The formative-assessment process involves using the evidence that teachers gain from student work on a daily basis to reform their instruction to take student thinking to the next level while sharing the intent of next steps with the student. The student then needs to take an active part in his or her learning (Popham, 2010). Popham expressed that the teacher's adjustments to instruction and the student's changes to learning tactics are crucial in the process of formative assessment. Heritage referred to this process as the *learning progression* (p. x). Heritage (2010) claimed that if teachers are held accountable for specific learning outcomes and high-stake assessments, then a "new science" is needed to

support teachers and show them the most productive process (p. x). The new science to support teachers is from an extensive study from Black and Wiliam (1998a). Black and Wiliam defined formative assessment as "encompassing all those activities undertaken by teachers, and/or by their students, which provide information to be used as feedback to modify the teaching and learning activities in which they are engaged" (p. 7).

The role of formative assessment in the classroom revolves around the interactive feedback between teacher, student, and peers (Wiliam, 2011). Wiliam stated that an assessment functions formatively to the extent that evidence about the 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 decisions they would have made in the absence of the evidence (p. 43). Determining what type of written feedback students receive to cause learning to occur is a critical piece that is missing from the research.

Grading and Feedback

Grading or assessment practice for most teachers utilizes the method of writing a percentage or a letter grade that corresponds to a numerical value for correct answers. It proceeds by giving the graded document back to the student and concludes with the teacher moving to the next topic and the student feeling great about the passing grade or having lowered self-esteem about the low achievement score. According to current research, feedback has an effect size from 0.26–0.72 depending on whether it is descriptive and explicit, and timing of feedback (Bangert-Drowns, Hattie, 2009; Kulik & Kulik, 1988; Kulik, & Kulik, 1991; Tenenbaum & Goldring, 1989). Current grading practices for students focus on the points achieved rather than the learning acquired. Motivation on the student's part focuses on receiving

a sufficient number of points to receive the score or grade that satisfies their goal of a particular grade. Students, who are not motivated by grades, often reflect on the grade as a personal failure, causing them to not hand in work, not complete assignments, and lose motivation in school and learning.

Research has shown that providing clear, accurate advice when giving feedback to students has a much greater impact on student achievement than summative feedback such as grades, symbols, or a number such as a percent correct (Black & Wiliam, 1998a; Hattie & Gan, 2011). However, there are methods of assessment that provide useful information to the teacher and can still be used to assign a grade (Wiliam, 2011). A paradigm shift in thinking about student assessment must occur in order to meet the needs of all learners. When teachers effectively use formative assessment, student learning is positively impacted (Black & Wiliam, 1998; Popham, 2010; Stiggins, 2002).

Teachers' perception about the importance of formative assessment and their understanding is essential in increasing student learning. Student achievement increases when feedback is provided on daily assignments, and it reveals the characteristics of formative feedback for the classroom teacher (Cauley & McMillan, 2009). Laud (2011) stated that formative assessments are used to guide teacher instruction and student thinking, in contrast to summative assessment, which summarizes learning. According to Angelo and Cross (1993), the purpose of formative assessment is to have a process that allows the teacher to become closer to what the student is thinking, learning, and sometimes feeling about the assignment. Angelo and Cross (1993) referred to this as the process of moving from a teacher-centered approach to a student-centered approach.

Overall, the purpose of this research was to characterize the feedback given from teachers on formative assessments, summative assessments, and daily classroom assignments. The purpose of the study was also to determine teachers' perceptions of giving feedback and students' understanding of receiving feedback. This case study allowed an investigation to conclude whether providing formative feedback to students can provide students the information they need to increase their achievement (Black et al., 2006).

Implications

The impact of the research will have a positive social change at the local, instructional, and student levels. The result of the study may have an effect on the local setting by initiating formative feedback strategies that increase student achievement in all content areas. Specifically, dialogue about written feedback has taken place between teachers who were in the study and causing these teachers to make changes to their feedback. Finally, while teachers have just begun to determine the type of feedback to write on assessments, it has given them an understanding of the impact and value of this instructional strategy that has shown evidence to increase student achievement.

The intent of this study was to determine if teacher written feedback has an influence on student learning. Assessment and grading practices have changed over the last 20 years due to high demands, the accountability of high-stakes testing, and government ties to state funding. Over the last two decades, assessment practices have been implemented to promote accountability; however, given the demands of NCLB, assessment practices need to improve, and the reliance on one method, such as summative assessments, no longer supports the process that needs to be in place to improve student achievement (Falchikov, 2005). Stiggins (2007)

suggested that the solution must involve balanced assessment systems and rethink the dynamics of assessment in effective schools.

The importance of this study on formative assessment and its influence on student achievement has never been more crucial than it is today. Uncovering specific feedback on formative assessments that increases student achievement will allow educators to give descriptive feedback to every student and focus on students' specific needs to support them in reaching their learning target or the required standard. It will also give students the tools needed to communicate their knowledge effectively and become aware of what they need to learn.

According to National Assessment of Educational Progress (NAEP), from 2011 to 2013, fourth-grade students increased scores by one point in mathematics across the nation. In Virginia, there has been no increase in fourth-grade mathematics scores according to the NAEP 2013 report. The NAEP report recorded gains in fourth and eighth grade across the nation; however, in the district there has been no increase in state assessments, and the number of schools at the elementary level who are not meeting state expectations grew from two to six out of the 11 elementary schools. The district has participated in NAEP for the last 8 years. NAEP assessments are conducted in March, as opposed to the state summative assessments given at the end of the school year. The results of the scores may be influenced by this time factor due to fourth grade students not having completed the fourth-grade school year and being given a fourth-grade summative assessment.

Stiggins (2007) claimed that summative assessments play a critical role and that balancing both summative and formative assessments by classroom teachers is a necessity. However, the use of formative assessment is not as frequent as summative assessments (Wiliam,

2011). The overarching research on the value of formative assessments is endless; therefore, focusing on formative assessment in this study will lead further research to identify the type of feedback that should be given to increase student achievement.

The use of formative assessment and understanding and conveying next steps in learning to students will have an eminent impact on student achievement because formative assessment is an assessment of learning. Waiting for the summative results at the end of the school year is not best practice nor does it increase student achievement. By understanding how to use formative assessment teachers will have the necessary tools to improve student learning.

The project has been presented to several administrators and teacher leaders in the district to help guide classroom teachers through a lesson study that involves grade-level collaboration at each of the schools. Teachers who took part in the study have gained the foundational skills to lead the collaborative process with a focus on formative assessment. Teacher leaders have had the necessary training and support materials to guide and facilitate the process, and ongoing professional development can occur during the school day.

After teachers receive professional development and gain the knowledge necessary to implement it, the findings and process can be communicated to parents. Schools can provide parent training sessions on the results, as well as individual sessions with each parent during conferences. Finally, the study may be extended to peer-to-peer feedback, which increases student achievement, according to Hattie (2007).

Limitations

Perceptions of teachers suggest there was some effect between specific types of feedback and student learning; however achievement was not measured and there were no

controls of other possible factors. Therefore, the data sources and design were limitations. The small number of participants may limit the research findings to the population. The school's student population and student participants were not reflective of the overall school population or the other schools in the study. Students were selected based on a criterion for support and the feedback received was considered a Tier 3 instructional intervention. Finally, student perceptions were another limitation due to how open students felt when answering the interview questions, how well they understood the feedback their teacher was writing on assignments, homework and tests, and finally, how comfortable they felt during the interview.

The school setting allowed for a convenience grouping through the administrative team and teachers before beginning the study. Formative assessment training has been conducted by internal staff and lead teachers in the district. Only one school participated in the Appalachia Regional Comprehensive Center formative assessment grant, as well as administrative-led book studies on Hattie's (2014) and Wiliam's (2011) text; however all teachers in that school and in the study did not participate in the professional development. The teacher participants received training on components of formative assessment and how to use formative assessment strategies in the classroom during instruction. Formative assessment training has been school-based as well as district-based, and the amount and fidelity in which these teachers use the attributes are accounted for through administrative walk-throughs and self-reporting during professional development training at the school level.

Scope

The scope of this study consisted of 10 elementary teachers who taught mathematics at two local elementary schools and 20 third- through fifth-grade students. There were four fourth-

grade teachers and four fifth-grade teachers. A sampling of two students from each class was utilized to select student participants. Criteria for student selection were students who did not pass the end-of-year state assessment or students who were receiving tier-two or tier-three intervention. There were four third-grade teachers, and two of those four teachers participated because they used formative feedback in their mathematics instruction for the 2014-15 school year.

Summary

There is much at stake when federal sanctions have been put placed on schools to ensure that all students pass the state summative assessments. Teachers' jobs or salaries may be affected based on how well their students score on the state assessments. The research was needed to understand the influence of formative feedback in mathematics and the elementary classroom setting. Though there is evidence that perceptions of teachers suggest there was some effect between specific types of feedback and student learning, this study does not conclude that formative assessment increases student achievement; however, it does conclude that, based on the perceptions of students and teachers, specific types of feedback do support student learning.

Section 2: The Methodology

Introduction

A qualitative case study was chosen to investigate the impact of written feedback on formative mathematics summative and formative assessments, daily written assignments, and homework. The purpose of this case study was to explore teachers' and students' perceptions of formative feedback and to understand the impact on student learning.

The research questions below were used to guide the case study:

1. How does formative feedback influence student achievement in elementary mathematics?
2. What types of feedback are teachers giving students on formative assessments?
3. What are teachers' perceptions of giving formative feedback?
4. What are students' perceptions of receiving formative feedback?

The philosophical assumptions, strategies for inquiry, and data collection methods of qualitative research were the best fit for this study. The impetus for conducting a case study was to gain comprehensive information about the effect of written formative feedback on achievement. A central characteristic of qualitative research is the process of trying to understand a phenomenon involving individuals in a real-world setting (Yin, 2013). The theoretical framework originated from the body of literature regarding the problem, thereby leading to investigating data in a natural setting (Creswell, 2012; Merriam, 2009). The data were then analyzed to determine trends and patterns that emerged (Creswell, 2005). Transcription of interviews followed to express the voices of participants in regard to specified interview questions. Qualitative research includes the researcher seeking to understand the setting of a

phenomenon through interviews and surveys and gathering information from student assessment data (Creswell, 2012). A qualitative approach to gathering data through interviews is a strategy that is frequently used (Merriam, 2002). All interviews were conducted face to face. The interviews were tape recorded and documented during the interview. Recording the interview (with the permission of the interviewee) offered the advantage of greater accuracy than could be achieved by writing notes alone (Opdenakker, 2006). Content analysis was eliminated as a choice, as using text to make valid inferences would have been an inappropriate methodology for this study (Neuendorf, 2002). After consideration of several qualitative design approaches, I selected the case study design because it offered the ability to investigate the use of written formative feedback by using data on teachers' perceptions gathered through interviews, data on students' perceptions gathered through interviews, and a collection of student work samples.

A quantitative approach for this study was excluded because there was not a need to seek or prove causation between variables. Experimental and quasi-experimental designs were considered; however, neither was appropriate due to the study not meeting the requirements for seeking causal relationships. A phenomenological study was contemplated but rejected because of the sample size needed and limitations on data collection.

The district has focused primarily on state summative assessments rather than on formative assessments during instruction. The problem for the study was that teachers were giving summative grades in the form of letter grades, percentages correct, or stickers, and students were not receiving any written formative feedback on work. If one waits until the summative assessment is given, it is too late to change student learning (Wiliam & Leahy,

2015). Student achievement has been, and will continue to be, of interest due to legislative actions such as ESSA, as well as state and local mandates that have all educators focused on assessment results. The focus on formative feedback is one strategy that has been proven in research to have an impact on achievement (Leahy & Wiliam, 2015).

A case study not only seeks out what is common that can be generalized to other populations, but also has results that are unique to the study population (Glesne, 2011; Yin, 2013). The physical setting of the case study was two schools, in which three grade levels were observed. The case study allowed me to examine formative feedback given to students from teachers on multiple assessment types (i.e., tests, quizzes, and homework). A qualitative method was used to analyze the real-life context-based problem of low mathematics scores (Creswell, 2012). This study used the Gipps et al. (2004) feedback typology and teacher interviews to describe teacher perceptions. Permission to use the feedback typology was granted. Along with teacher interviews and student interviews, teacher feedback on work samples was used to analyze type and level of teacher feedback given to gain an understanding of students' perception of formative feedback.

This study was based on a study by Gipps et al. (2004) about what makes a good primary school teacher, and its foundation of support was derived from Schunk's (1982) research on student self-efficacy and Bandura's (1997) study of student motivation. Formative feedback can increase student self-efficacy (Bandura, 1997). Assessment is not formative unless there is a cyclical process between the teacher and students whereby the students act on the teacher's feedback in order to change their level of understanding (Heritage, 2010; Schunk, 1983; Wiliam, 2011). Therefore, by including teachers' perceptions of giving feedback and

students' perceptions of receiving feedback, I drew conclusions from analyses of the specific phenomena that occurred within the elementary mathematics classroom.

Interviewing was the primary data-gathering method for this study, and a semistructured interview was used, for which questions were designed to provide adequate analysis for the purpose of the research (Creswell, 2012; Merriam, 2009). Numerous interview questionnaires were considered for the study. An existing instrument did not align to the study; therefore, interview questions for both teacher interviews and student interviews were created to answer the research questions. A standardized interview approach was used. All questions were identical for each of the participants; however, further questions were asked in some interviews to allow the interviewees to expand on their perceptions (Gall, Gall, & Borg, 2003). Data from teacher interviews regarding perceptions of feedback and assessment were gathered using open-ended questions that honed in on the understanding of formative feedback.

After IRB approval (IRB approval number: 07-29-15-0271662), interviews were conducted with 10 elementary school teachers in Grades 3, 4, and 5. Data were collected using a teacher interview guide (Appendix B) and a student interview guide (Appendix C). The teacher interviews helped to elicit information about feedback given to students and provided insight into the teacher's perspective on student achievement. The questions were framed around the concepts of feedback and allowed for further prompting to investigate the thoughts behind written feedback on assessments, homework, and student assignments. The teacher interviews were between 45 and 60 minutes in length.

Twenty students from third through fifth grade were interviewed. Two students were selected from each of the 10 classrooms. Students were selected based on failing scores from

the previous year's end-of-year summative assessment results, receipt of Tier 2 or Tier 3 interventions, and teacher recommendation. The student interviews uncovered student perceptions of descriptive and evaluative feedback received from their teachers. The student interviews took 15–30 minutes to complete.

Along with teacher and student interviews, the FTC was used to determine the four levels of evaluative feedback (A1—Rewarding, A2—Punishing, B1—Approving, and B2—Disapproving) and four levels of descriptive feedback (C1—Specifying attainment, C2—Specifying improvement, D1—Mutual construction of achievement, and D2—Mutual construction of improvement) that were used on students' summative and formative assessments, homework, and daily assignments. Student assessments were collected over a 3-month period and used as student examples during the interviews with each of the 20 students. The number of assessments collected depended on the number of assessments given in that 3-month period for each of the students. Approximately four or more of each of the different types of assessments and homework assignments were secured per student to represent the type of feedback given to each student. After each of the interviews had been coded according to the feedback typology and topics, each of the coded data categories was given a descriptive code to summarize the primary topic (Saldana, 2013). This process allowed me to summarize and code the data, which helped to reveal trends and patterns for data interpretation (Merriam, 2009).

Each student was given a number, and students' names were removed from all assessments to ensure confidentiality. This process protected the identities of all participants. Mathematics summative assessments, formative assessments, daily work, homework, teacher

interviews, and student interviews were used to determine student achievement as well as the types of feedback given using the feedback typology found in Table 2.

During the teacher interview process, teachers were given access to each of their students' mathematics summative assessment scores for their common assessments. Teachers in Grades 3 and 4 gave two common assessments, and teachers in Grade 5 gave one common assessment during the time frame of the study. Teachers conveyed their perceptions on how each of their two students had progressed over the last 3 months after being given written feedback. Furthermore, teacher interviews, student interviews, and student formative assessment feedback data were triangulated to understand the specific type of feedback that may influence student achievement in mathematics. Interview notes and audio-recorded interviews were analyzed and transcribed. The feedback typology (see Table 2) allowed me to code the different types of feedback on student mathematics formative assessments. Using the Gipps et al. (2004) typology, teacher feedback was coded as either evaluative or descriptive. Peer debriefing was used to enhance the accuracy of the data collected (Creswell, 2012). There is a wealth of research that shows how descriptive feedback increases student learning (Black & Wiliam, 1998a; Brookhart, 2008; Hattie & Timperley, 2007). The study allowed for an in-depth look at the types of feedback students received and at student learning by delving into teacher and student perceptions.

Participants

Criterion sampling, a type of purposeful sampling, was used. The teacher participants had received previous professional development in formative assessment and applied formative feedback strategies in their classrooms. Selected teachers taught elementary mathematics in

either third, fourth, or fifth grade. Participants in the study were 10 elementary teachers from two elementary schools in Grades 3 through 5. There were four teachers from Grade 4, four teachers from Grade 5, and two teachers from Grade 3.

A total of 20 students took part in the study. Criterion sampling was used to select students; however, teacher recommendation also took place. A sampling of each classroom, with two students from each class, was used to select student participants. For all classrooms, one male and one female from each group were selected. Four third-grade students who were on Tier 2 or 3 and were receiving interventions or whom teachers selected based on need were participants. In Grade 4, eight students who scored 16 or less out of 40 items on the third-grade end-of-year state mathematics assessment (2009 standards) or who received Tier 2 or Tier 3 interventions were selected. Finally, two fifth-grade participants in each of the four classrooms who scored 17 or less out of 50 items on the fourth-grade end-of-year state mathematics assessment (2009 standards) or who were receiving Tier 2 or Tier 3 interventions were selected.

Math assessments and daily assignments with written feedback were collected from each of the students in the10 classrooms. Assessments were graded by the classroom teacher with feedback and returned to the participant after copies were made. Student interviews were conducted using the student interview protocol and students' specific work samples that were collected weekly. Written parental consent from the underage participants was collected before interviewing students. Each interview took place in a private setting within the school, was one on one, and lasted no longer than 15 minutes. The interview was brief due to the age of the students and the specifics of the questions. Classroom instruction was not interrupted, and students were asked prior to the interview if they would like to proceed with the interview to

give students the opportunity to decline. The interviews took place in a private room within each of the schools. Finally, electronic data were kept on my personal, password-protected computer. No students declined; however, if any had, I would have thanked them and allowed them to rejoin the rest of the class (see Appendix C).

Teachers from each of the 10 classrooms had participated in more than 10 hours of professional development. These teachers were selected based on their training on formative assessment practices in the classroom and knowledge of feedback to students. Eight of the 10 teachers had been trained on formative feedback through Appalachia Regional Comprehensive Center, the Virginia Department of Education, or Lynchburg University in the 2014-2015 school year and had participated in a formative assessment book study at their individual schools. Two teachers had professional development on formative feedback and had been involved in formative assessment book studies during the 2014-2015 school year.

Gaining access to participants without disrupting the normal flow of the day was critical due to the academic setting where the research took place. I established levels of trust with the teachers at the school. At no time did the administrator violate that trust by asking me to divulge information from the study. I further established a researcher-participant working relationship by explaining to the participants that the research would consist of a one-on-one interview, selecting students to interview, and collecting assessment samples to discover how feedback impacts student achievement. Assessment samples were collected periodically from the district and were not in addition to common expectations from teachers.

Procedures for Accessing Teacher Participants

Teachers were recommended by their administrator, after which face-to-face conversations took place to ascertain whether they were interested. If a teacher was interested, then a letter was mailed to obtain participation and authorization. The teachers all signed the agreement for participation and had the opportunity to decline at any time during the study. A letter of authorization was secured from the school's superintendent, authorizing access to each school and participants to begin the study and to gain permission from the teachers and students. The letter was presented to the IRB and will remain in an electronic secured file for documentation. Identification of the participating school and teachers is also in an electronic secured file. There is no personal or identifiable information included in the secured file. All hard copy information will be in a secured file cabinet, and all electronic information will be saved in an electronic file that is password protected and retained for 5 years.

Procedures for Accessing Student Participants

Parental agreements were obtained by sending home parental agreement letters with all selected student participants. Along with the agreement, a brief overview of the study with contact information was attached to ensure that parents understood the procedures and to allow for them to explain the procedures to their children. All names were removed, and no identifying information is on the documentation.

Analysis of Data

The purpose of this qualitative case study was to gain an understanding of teachers' and students' perceptions of written formative feedback in a school setting. Following the data collection and analysis, a synthesis of the findings is presented based on the study's research

questions. Direct quotes represent both teacher and student perspectives. An explanation of how the FTC was used to categorize trends and patterns is included.

Feedback Typology

There are four levels of evaluative feedback and four levels of descriptive feedback, according to the Gipps et al. (2004) feedback typology (see Table 2). The four levels of evaluative feedback are A1—Rewarding, A2—Punishing, B1—Approving, and B2—Disapproving. Evaluative feedback ranges from giving rewards to giving punishment, and from expressing approval to expressing disapproval. Evaluative feedback is led by emotions. The four levels of descriptive feedback are C1—Specifying attainment, C2—Specifying improvement, D1—Mutual construction of achievement, and D2—Mutual construction of improvement. Descriptive levels represent teachers telling students what they are doing right and what they are doing wrong and describing why the answer is correct, as well as telling students what they have and have not achieved. Teachers also specify or imply a better way of doing a task or problem, in addition to discussing with children the features of a piece of work. D2, the highest level of descriptive feedback, may be provided once the other three components are in place, as it involves getting students to suggest ways in which they can improve.

Teacher Data Collection Process

Data collection took place individually through each of the 10 teacher interviews. Each teacher interview was held at a convenient time for the teacher and lasted no longer than 45 minutes. At the beginning of the interviews, the participants were given a brief overview of the study and were notified that they had a right to decline without judgment (see Appendix B). Predetermined, structured interview questions were asked, and participants were allowed to ask

the interviewer questions (Yin, 2013). Participants were asked to communicate their experiences freely (Merriam, 2009). When clarification was necessary, probing questions were asked to gain an in-depth understanding from each of the participants (Glesne, 2011).

Student work samples and end-of-unit common summative assessments were discussed with teachers during the interview process. The interview was recorded and transcribed after the interview took place and the transcript was given to the participant for review to ensure accuracy. Interview notes were taken while the interview was being recorded (Merriam, 2009). Procedure of the data collection process was as follows:

1. Collect student work samples weekly
2. Code student responses
3. Interview students
4. Code student interviews and analysis of student work samples
5. Interview teachers
6. Code teacher responses based on interview and analysis of student interviews
7. Determine patterns and trends to formulate themes

Teacher Interview Analysis

Data analysis in qualitative research involves a process where the data are collected and analyzed simultaneously (Creswell, 2012). A three level analysis was used to determine the impact of teacher feedback on student learning. Teacher and student interviews were analyzed, along with student work samples, to enhance validity and reliability (Yin, 2013). This process allowed me to monitor biases which may occur when analyzing one's own data. Having teachers refer to the FTC when asking questions about their perception allowed teachers to see

the connection between the feedback that was given and understanding the different types of feedback according to the typology. Teachers were able to make connections between the types of feedback given and their perception of how the student was learning.

Teacher and student interviews and student work samples were analyzed and documentation was revealed to participants to ensure the accuracy of coding based on the FTC categories. Initially, the interviews were transcribed and coded and then detailed descriptions of each of the comments were written. Teacher feedback from student work samples was transcribed and coded based on categories from the feedback typology (see Appendix E). Themes from the teacher interviews and student interviews were then compared to the student work sample transcriptions to reveal trends and patterns. After a thematic analysis of teacher interviews, student interviews, and student work samples, results were disclosed with each of the teachers to ensure accuracy in coding the correct feedback type and level. All information was given to the teacher to ensure validity. Student learning was based on a thematic analysis of teacher perception and student perception. Thematic analysis took more time due to allowing teacher participants to review coding themes and comparing information to the FTC. However, having teachers review the themes and see the analysis compared to the FTC ensured validity and reliability.

Teachers' understanding of evaluative and descriptive feedback varied among the 10 teacher participants. Teachers who had professional development that was a part of their annual goal or were part of a team that collaborated on formative feedback throughout the school year gave more descriptive feedback to their students than those teachers who did only a book study

or worked independently to learn more about formative feedback. Most teachers believed that they gave evaluative and descriptive feedback to their students.

Teachers were asked if they differentiated feedback for different students, and if so, how. All 10 teachers said "yes"; however, three teachers said they differentiated by task rather than by the type of feedback. When these three teachers were asked to explain their thinking, all three teachers revealed that descriptive feedback is more about telling or questioning the student about next steps according to the objective that student needs to master. They all three shared that the feedback had to be based on what the students have not mastered compared to the goal of the task. Each of these three teachers confirmed that the feedback had to be actionable feedback. Students needed to know next steps and it had to be an expectation that students did something with the feedback. Steps to reaching the objective need to be differentiated by the teacher. The other seven teachers who claimed they differentiated the feedback comments varied from task and process-oriented feedback, feedback that was personally related to the student's disposition, and feedback that was encouraging, for example, "good job," "well done," "you can do it". When teachers examined their own feedback from the transcripts compared to FTC, this gave insight to the teachers to reflect on their own feedback. Teachers' perceptions of formative feedback were gathered through one-on-one interviews but then compared to their written feedback on student work samples.

Based on the analysis of the teacher interviews and written feedback on student work samples, teachers shared different feedback combinations; Teachers number 1, 8, and 10 used all four levels of descriptive (C 1, C 2, D 1, and D 2) written feedback. These examples include C1 Specifying attainment, C2 Specifying improvement, D1 Mutual construction of

achievement, and D2 Mutual construction of improvement. However, their written feedback varied due to content and was based on specific gaps in the content. Examples of the descriptive feedback shared from the three teachers were:

C1—Specifying attainment (from teacher interviews):

> I always tell my students what is correct and what is incorrect. I differentiate my feedback to make sure students know exactly what their next steps are. If I gave only one type of feedback, then my students would not make progress. My students expect me to write them notes and explain what they need to do next.

C1—Specifying attainment (from Teacher 8 written feedback on student work):

> Lining up decimals has improved your accuracy, be sure to use this strategy on numbers 4-7.
>
> Use your lined paper to make sure your columns are straight.

Teacher 8 shared "by reminding this student of the strategy, and that he needed to draw his lines first, or remind him of turning the lined paper, helps him realize that place value is important and every digit means something different."

Teacher 1 (written feedback):

> Remember you do not need a zero placeholder if the difference begins with zero. The zero does not change the value. Prove your answer when you are writing in expanded form.

Teacher 1 stated during her interview that "by writing feedback on a student's paper or work they are expected to do something with the feedback. This process keeps

communication lines open and allows the teacher to know what the student is struggling with and lets the student know what to do."

Teacher 10 (written feedback):

Draw your thinking out when you have multiple steps.

You are leaving one step out of each of the problems.

Teacher 10 explained: "having the students use the process standards and drawing representations of the problem helps them see the problem and the solution in a real life setting."

C2—Specifying improvement (from teacher interviews):

Teacher 1: "My students like when I give them an alternative way to do a problem."

Teacher 8: "I share several ways or resources when I give students feedback because all students learn differently. I give constructive feedback that also gives the student another way to solve the problem."

C2—Specifying improvement (from teacher written feedback):

Teacher 1:

Look at the last number to tell if it is odd or even.

Would using a highlighter help?

How can you add more to this to more clearly explain your thinking?

Teacher 8:

Use the word variable in your explanation.

Look back in your math notebook and think about the procedure for number 4.

I appreciate how precise you were in number 6.

Apply the same technique to numbers 9-11.

Teacher 10:

What did you forget?

Remember when we regroup we add 10 ones to our tens column.

You really understand the commutative property.

You made your numbers correctly; we will focus on aligning numbers next time.

D1—Mutual construction of achievement (from teacher interviews):

Teacher 1: "I encourage my students to respond to my feedback."

Teacher 8: "Students have been taught to respond to the feedback because if they do not use it, the learning is stopped."

Teacher 10: "My students and I are on the same team." "We are in this together and they know I care, which in turns makes them care."

D1—Mutual construction of achievement (from teacher written feedback):

Teacher 1: "You did a nice job with accurately placing your decimals on the number lines." "The strategy you chose worked well on these problems."

Teacher 8: "You did a nice job with accurately placing your decimals on the number lines." "The strategy you chose worked well on these problems." "Does that same strategy work on number 10?" "Why or why not?"

Teacher 10: "Can you do 4-6?" "When the top number is smaller remember you need to regroup."

D2—Mutual construction of improvement (from teacher interviews):

Teacher 8: "I always add a reflection rubric at the bottom of student assignments to allow us to discuss where the student is in his thinking."

Teacher 10: "I share with students what could be done differently and ask them to share with me what they liked or disliked about the task before I look at the assignment." "I give my students a rubric to self-reflect before and after the assignment." "I ask them to suggest ways that they could improve."

D2—Mutual construction of improvement (from written feedback):

Teacher 1: "My Next Steps: Be sure to use lines to make sure the correct answer is the right value."

Teacher 8: "What are your Next Steps?"

Teacher 8 and 10 used a written feedback rubric to capture students' feedback which had a response section for the teacher to share her response to the students' responses.

Teacher 10: "Great job adding." "Tomorrow we will be working on writing our numbers correctly." "You forgot the 0 placeholder in 335,014; we'll work on this tomorrow."

During the face-to-face interview, Teacher 1 communicated that "by using descriptive feedback students were able to understand what they needed and the steps they needed to increase their understanding." Teacher 8 communicated that "differentiation was used when giving feedback based on the students' strengths and weaknesses rather than on the type of feedback that is given." These three teachers consistently used all four levels of descriptive feedback and felt that written descriptive feedback given to students allowed students to focus on what they needed to do next to reach the stated goal. Teacher 1, 8, and 10 shared that they

believed their feedback was less personal and more about learning. These three teachers revealed that the descriptive feedback had an impact on student learning. Teacher 10 explained:

> The feedback on assessments that I give to students seems to really help my students. I give descriptive feedback, with specific suggestions, so that students know exactly what they need to do. I had one specific student who was struggling with adding and regrouping; he kept forgetting to move the ten over in the tens column, even after we practiced with concrete manipulatives. On the quiz he made the same mistake, so I wrote on his paper that he is remembering his facts; however, I want you to remember how we practiced place value and to look at the ones place. Look at numbers 12-16 and think about what can the largest number be in the ones place. I was able to conference with the student after he was given his paper back and he explained to me that the comments helped as he explained what he was doing incorrectly and what he now understands. His grades have improved and he understands that the comments on his paper are to help him learn.

Both Teachers 1 and 8 communicated similar beliefs about formative feedback and the process for assessing formatively. Teacher 1 communicated:

> I mostly give descriptive feedback, because I want my students to focus on their learning and determine what they are going to concentrate on when they rework the problems and when they see the same type of problem later. The children seem to like receiving written feedback, and they are responding well to it. They are able to see the direction that they now need to move toward in their learning. I can see their thinking changing and more consistency in their understanding.

Teacher 8 commented:

> Both students who were struggling have improved tremendously in their grades and are more motivated to try and rework their mistakes, when previously they would drop their heads and cram their tests in their desks, and give up. In the beginning we discussed how I was going to be writing comments on their papers and that they should read the comments, ask clarifying questions, and try and make sense of what to do, based on the comments. I think it is important to teach this process. I think they know I care about them when I add comments and they know learning does not end with a bad grade; it ends when they get it.

These three teachers expressed that it was important for students to know what they did correctly and what they did incorrectly. They expressed that teachers need to be specific in giving next steps based on each student's strengths and weaknesses. It was important to each of the three teachers that they give the students the opportunity to reflect on their progress and suggest ways that they can improve. The three teachers who used all four levels of descriptive feedback indicated that all six of their students were making gains in their understanding and felt that they would be successful on the end-of-year summative assessment.

Based on the analysis of the teacher interviews and written feedback on student work samples Teacher 2 indicated that she used three of the four levels of descriptive feedback. Examples of C1 Specifying attainment, C2 Specifying improvement, and D1 Mutual construction of achievement that Teacher 2 shared were:

C1—Specifying attainment (teacher interview):

I try and describe in words what steps the student needs to take or I share with them the steps in order, and if they are missing the third step in a five-step process, I leave that one blank and ask them to fill it in and go back and rework the problems they missed.

C1—Specifying attainment (written feedback on student work):

"Nice use of 0s." "Love your use of representations." "I am so proud of you for using the strategy we discussed in class." "Reread the fraction and see if it matches the decimal when you reread the decimal." "Fantastic use of your new strategy of turning numbers into tenths and hundredths." "Be careful when adding; write the fraction first." "Redo as a fraction." "Try number 14 and 15 again."

C2—Specifying improvement (teacher interview):

I want my students to know when they are not meeting the goals that I set forth for them. I give them hints, but I show them several strategies and ask them to find the one that works best for them.

C2—Specifying improvement (written feedback on student work):

"Try this one again." "Compare your answer to the learning target that is stated on the wall and let me know if you have any questions."

D1—Mutual construction of achievement (teacher interview):

"I give my students the opportunity to fix their mistakes on any assignment." "I explain to my students why they were incorrect and then have the student tell me where they need support."

D1—Mutual construction of achievement (written feedback on student work):

"Remember to always go back and make sure your answer makes logical sense." "Your use of the place value chart helped you with your answers." "When you share your representations, I can see clearly how you thought about the problem."

Teacher 2 shared student work samples that revealed comments in the same categories as her interview. Her comments aligned to C1 Specifying attainment, C2 Specifying improvement, and D1 Mutual construction of achievement. During the one-on-one interview, Teacher 2 explained that she gave both evaluative and descriptive feedback orally; however, she only gave descriptive feedback on assessments, homework and class assignments. She indicated both of her students were making significant process and she felt that the feedback on the students' work was part of the reason. The teacher verified that her two students were receiving passing scores on their end-of-unit math summative assessments and on their progress reports. During the interview she conveyed:

> I give more descriptive feedback daily and I don't give every student descriptive feedback on their assignments and tests. Each student is different, has different needs, and there are days when some students need positive evaluative feedback to boost their motivation. I always give descriptive feedback to students who are struggling and this does not come natural to me. I had to make myself think about the specific wording in a sequential order to support the student where he needed to go next in his learning. I don't think I could do this for every student, but it has shown me that this strategy does help students understand the concepts and the student feels like they have accomplished

something when they work on the feedback that I have given, and then they understand the concept or problem.

The analysis of the interview with Teachers 7 and 9 revealed these teachers gave only evaluative feedback. Teacher 7 gave A1 Approving and B1 Punishing evaluative feedback.

A1—Approving examples (teacher interview):

"I give my students stickers because this encourages them to work hard."

"I tell my students good job even when they missed a few because this builds their self-esteem."

A1—Approving examples (written feedback on student work):

"Nice job with the model." "Good Job!" "Awesome Work!" Teacher gave stickers.

B1—Punishing evaluative examples (teacher interview):

"Sometimes my students will stay in at recess when they need to practice."

B1—Punishing evaluative examples (written feedback on student work):

"You need to try harder, make sure you pull the practice worksheet for homework."

Punishing B-1 pertains to making the student do more practice when they have not been taught or not informing the student about what to do next. Telling a student to try harder does not give reference to the student's particular area of concern (Gipps et al., 2004).

Teacher 9 gave A1 Approving, A2 Punishing, B1 Approving positive, and B2 Disapproving negative feedback. Examples from these categories are:

A1—Approving (teacher interview):

"I tell my students they are doing a good job by giving them stickers, telling them they are great, and putting smiley faces on their papers."

A1—Approving (student written feedback):

"Very Nice Job!" "Good Job!"

A2—Punishing (teacher interview):

"Our grade level has one teacher stay in everyday during recess for those students who did poorly on an assignment."

A1—Punishing (student written feedback):

"Slow down and read directions carefully. Retest was the same score of 68%. Make sure you are reading the questions carefully, do page 10 again for homework."

Instead of "slow down and read directions carefully" in order for the feedback not to be punishing, the teacher could rephrase and say, "Please see me to make sure you are understanding the directions" and not give another page for homework without meeting with the student to ensure the student is able to do the worksheet. Gipps et al. (2004) explained that most students do their best and try their hardest; therefore clarifying with students what they need to do will ensure that students understand, and it gives the teacher an opportunity to hear what the students are thinking.

"Retest was the same score of 68%" is a punishing statement based on student perception. Student 5 shared that when a teachers writes this on their paper they are inclined to give up and not try. Student 5 stated, "I feel like giving up because her comment hurts my feeling and I don't know how to fix it." Student 8 stated, "I feel like I am being punished because I can't figure it out on my own."

B1—Approving positive (teacher interview):

"I want my students to know I care about them, so when I give written feedback, I tell them how proud I am of them."

B1—Approving positive (student written feedback):

"Very Nice Job!" "Good Job!" "Much improved!"

B2—Disapproving negative (teacher interview):

"Sometimes I give sad faces when students make mistakes, or I put an "X" on the problems that they missed."

Disapproving negative is different from punishing in that it does not carry a consequence. Disapproving negative is internalized by the student that he or she has failed and there is no recovery. Students should have the opportunity to learn and respond to mistakes rather than receive a mark on their paper that deems them to be unsuccessful and never have a chance to learn.

B2—Disapproving negative (student written feedback):

"52%/F." "The other teacher told me you need to practice your facts!"

These two teachers stated during their interviews that their students were still struggling and little to no progress was made in learning. Student work samples indicated only evaluative feedback was given to students. Teacher 9 explained:

> I give a lot of verbal feedback and very little written feedback, because that is how I learn. The students seem to get it when we are conversing; however, when it comes to the assessment, they have forgotten what we discussed.

Teachers 7 and 9 stated there are a lack of professional development opportunities and focus on formative assessment in the district. When disclosing the analysis with teachers 7 and 9, both indicated they would like to know more about formative feedback and how to meet the needs of all students. The overall consensus from these two teachers was that they gave feedback to students, but need to take action or do something with the feedback given.

Teachers 3, 4, and 5 were interviewed and the analysis indicated they used a combination of evaluative and descriptive feedback. According to these three teachers, they were beginning to understand how to give feedback to students both orally and written. Two teachers (3 and 4) were seeing some gains in their students' progress, but not the gains that they would like to see. They implied the gains were students' self-confidence levels. Their student work samples showed a combination of both evaluative A1, B1, and descriptive C2, D1, and D2 feedback. Some of the consistent evaluative comments from both teachers (3 and 4) were: "Good job!" "Well Done!" "I know you can do it if you try harder." Common descriptive comments from both teachers (3 and 4) were: "Go back to your math notebook and see the definition of parallelograms to help you answer questions 1-5. Refer to your math vocabulary cards and explain the similarities and differences in each of the shapes." These two teachers collaborated on planning and grading and have taught together for the last 9 years. Most of their student work samples were the same and their comments were the same for their students.

The majority of the comments on student work samples that Teacher 5 gave were descriptive in nature, and she conveyed she was not seeing any progress with her students. All three teachers implied that they had seen an increase in their students' self-confidence. Teacher 3 commented:

> Besides a slight increase in their learning, I have seen an overall increase in self-confidence in their ability, because of the written feedback. This is the first year I have given written feedback and I make sure I give these two students written feedback every day. When giving students written feedback, there is sometimes momentary emotion, either happiness or disappointment. Students' stamina is longer as well when they are re-doing problems. Sometimes they would not do it at all or they would give up. Even though their scores are not increasing, it seems like they know I care because of the comments and attention they are receiving, and it seems like they want to do the work.

Teachers 3 and 4 conveyed that they have noticed that their students were more open to asking questions than before they began giving them feedback. Both teachers commented on how students were receptive to the feedback and then wanted to know why they did not get feedback on some of the work that the teacher did not reply on. Again, both teachers told the students that if it was a careless mistake, and they could tell the student understood the concept, then there was no need for feedback. The teachers said their students seem to understand why some papers had written feedback and some did not. Teacher 4 stated:

> It seems as though this process has helped in building my relationship with my students. It feels like the students are less guarded and more open to taking risk without the fear of being wrong. I feel like my two students have more confidence since I began giving them written feedback.

Teacher 5 had a combination of A1, B1 evaluative feedback, C2, and D2 descriptive feedback. The majority of the feedback that she wrote on students' papers was C2 and D2 descriptive feedback. Some of the examples for C1 Specifying improvement reflected comparing students'

work to the learning objective, and D2 Mutual construction of improvement, getting students to suggest ways to improve. However, she revealed that her students were not making progress; in fact, they were falling further behind. This was an anomaly because all other teachers who used any descriptive feedback implied that students were making progress in their overall learning. When going back and analyzing the descriptive feedback, it was also aligned to the content and gave next steps based on the students' answers. The third level of analysis using the student interview responses provided a clearer understanding of why the students of Teacher 5 were not improving. Both students (9 and 10) shared that their teacher wrote comments on their papers, but they had no idea what the comments meant because the comments were written in cursive (see Appendix G). Student 9 shared "I don't know what she wrote and my mom works nights so I don't have anyone to tell me what my teacher wrote." Student 10 commented that her parents sometimes read the comments, but she thinks it is something bad so she doesn't usually show her parents.

Lastly, Teacher 6 gave only A1 Approving evaluative feedback. For example she wrote many times on the students work: "I love it!" "Great Job," "Well done," "Excellent!" or she gave stickers. She revealed her students were not making progress and she did not believe giving feedback was useful. She commented:

> I usually give verbal feedback. I always tell the students they are doing a good job because I think that is important. I am not sure they are reading the written feedback. I feel like when students are motivated, they will ask about the feedback, but if they are not motivated, they do nothing with the feedback. Based on the feedback typology that you (the researcher) have provided, I think I give more evaluative feedback. I give a lot

of stickers and smiley faces along with “good job” and “well done”. Maybe I need to learn more about how to give descriptive feedback.

Overall, teachers’ perceptions were based on their understanding of formative feedback. Teachers who indicated an in-depth understanding of the different types of feedback gave more descriptive feedback to students, and they believed their students were making progress on the end-of-mathematics-unit assessments and on class work. Only one teacher had a deep understanding of the type of feedback that students needed, but students were not able to interpret the feedback due to the teacher writing in cursive. These teachers also stated that each of their students had a better understanding of mathematics concepts and more enthusiasm for mathematics. Teachers suggested throughout the interviews that limited professional development was a concern and wanted more resources on formative feedback as well as to spend time with colleagues discussing formative feedback.

Student Data Collection Process

Qualitative research occurs in a natural setting, intending to interpret an event or experience of the meaning that participants bring to the researcher (Denzin & Lincoln, 1994). All students were interviewed in a natural setting within the school. Students had the opportunity to discuss their personal experiences during the structured interview and after the interview. All interviews were recorded with permission from the parent and student. Students were given a brief overview of the study and were told that if they wanted to stop or not do the interview, they had the right to decline without judgment. Data collection for students took place individually with each of the 20 students, during the school day, in a private location within the school.

Student assessments were collected at the end of each week for a 12-week period after the teacher graded the assignment or assessment and gave written feedback. Copies of the assessments were coded prior to student interviews. The individual student copies were then shared with the corresponding student. Each of the students was initially asked to review the comments on the work samples and tests to ensure readability and comprehension of what was read.

All assessments had a number identifying the student, and names were removed for confidentiality. Up to 30 work samples from each student were collected from each of their teachers. A total of 318 student work samples were collected. Student assessments and work samples were used during the interview, and interview questions were consistent among participants; however, one other question was asked of each of the students at the end of each interview. I asked the students if there was anything else that they would like to tell me about what they needed from the teacher as far as giving feedback.

When responding to Questions 1 and 5 from the Student Interview Protocol each student had their work samples in front of them (see Appendix C). On Question 5, I gave the students only from one to three examples due to the different types of feedback that the teacher gave. If the students received a combination of different types of feedback, then understanding what they did with each type was coded in the multi-level analysis.

Finally, student answers were restated to students after the interview to ensure answers were recorded and summarized correctly. Member checking was used to engage participants and to ensure reliability and accuracy of interview responses. I thanked each of the participants and returned the students back to the classrooms.

Student Interview Analysis

There was a multi-level data analysis approach that determined student perception of the impact of written feedback from teachers. The multi-level approach included coding of student interviews determining two themes. Initially, interview comments were coded determining common themes. The themes of positive (supporting student learning) and negative (not supporting student learning) effect were then coded to the FTC identifying the specific student comments to the categories in the FTC (ie. A1, A2, B1, B2, etc.) in the second coding process.

In the third coding process, student work samples that were collected were used during the student interviews as examples for students to interpret the type of feedback from their individual teacher and were coded to determine how students perceived the feedback. After interviewing students I conducted a detailed analysis by coding and categorizing descriptions and themes of teacher and student interviews. General findings were then synthesized from the descriptions and themes.

The in-depth investigation focused on how written formative feedback on student work within mathematics may have affected student achievement in third through fifth grades. The key research questions were:

How does formative feedback influence student achievement in elementary mathematics?

What are students' perceptions of receiving formative feedback?

During the one-on-one interviews, work samples were given to students, and they were asked to explain what the comments, grade, or marks on their papers meant to them. A wide

range of feedback was given to students from teachers: comments, stickers, percentages, and marks for correct and incorrect were the category types of feedback.

Students Who Received Descriptive Comments

Students 1, 2, 15, 16, 19, and 20 received all descriptive feedback based on the analysis of their work samples, student interviews and from their teacher's interview. Examples of the descriptive feedback from these six students are as follows:

C1 "Nice job using inverse operations."

C2 "How can you add more to this to more clearly explain?" "What about the end number? Look at the last number to determine odd or even. What did you forget?" "How would you say this?" "Would using a highlighter help with this problem?" Use the word variable in you explanation. Be precise in your explanation."

D1 "You did a nice job with accurately placing your decimals on the number lines." "The strategy you chose worked well on these problems."

These six students shared that the feedback written on their work samples was important to them. They each indicated they have never had teachers who expected them to read the comments and do something with the comments. When asked "What do the comments do for you?" Student 1 stated, "My teacher's comments make me try harder and I know my teacher believes that I can do it and I want to try hard because she believes in me." Student 2 shared, "I like getting the comments because if you don't know how to do something you should always try, but if you get it wrong I know my teacher will give me tips to help me learn what I am supposed to learn." Students 15 and 16 believed that the tips that the teacher gives on their work and the questions that the teacher asked, helped them focus on what they needed to do. Students

19 and 20 agreed that comments were important and they know that the teacher cares when comments are on assignments. All comments were analyzed and coded to the positive theme and then coded to the FTC revealing they were all descriptive feedback comments.

Students 1, 2, 15 and 19 stated that reading the comments meant they were going to have to do more work. All four children reported that it was good to get comments from the teacher because by the time they get to the test they have learned everything they need to learn and the test is easy.

Students 15 and 16 had positive remarks about how they use the feedback. Student 15 commented, “When the teacher writes me notes, it encourages me to do better and it makes my teacher proud of me.” “I like comments best because grades are done. I never used to get to go back and try again on a test until this year.” “I used to just throw my papers away and now I read my comments and make changes and then meet with my teacher if I have questions or hand my paper in again for my teacher to grade.”

Students 19 and 20 both believed they try hard now since their teacher writes notes on their papers. Student 20 commented, “The comments show me that I can do things in a different way.” “The comments give me hints and when I do the problems a different way, my teacher knows that I am trying.”

All six of the students from teachers 1, 8, and 10 stated that besides descriptive feedback given by the teacher they felt that the teacher expected them to set goals for themselves and to think about the feedback that was on their papers. All six students felt that the comments helped them do better in mathematics.

Student 3 and 4 received all descriptive feedback, but only received C1, C2, and D1 (see Table 2). These two students did not receive D2, which is mutual construction of improvement, where the students can suggest ways that they can improve. The teacher claimed that these two students made continuous progress and were on grade level. The teacher discussed how her students were achieving and what her next steps were in learning more about formative assessment:

> Both students that I gave written feedback to are improving and seem to respond well to the written feedback... I am moving into goal setting next month because I want students to become aware of their own learning and I want them to suggest ways that they can improve...I am really not sure where to begin, and our school is not providing professional development, so I am going to try and find more research on this topic and talk with my team about it.

Students Receiving Descriptive and Evaluative Comments

Students 5, 6, 7, 8, 9, and 10 received a variety of descriptive and evaluative feedback. All six children claimed they would like the teacher to write how to fix their mistakes. The students believed that stickers and smiley faces did not help them learn. Four of the students felt that feedback helped them sometimes. Student 6 stated:

> Sometimes I know what to do to fix my mistakes and sometimes I just get an "X" on the number and I don't know how to fix it or if I should fix it... my parents and they help me with the ones that I got wrong, but I don't show my teacher.

Students 7 and 8 both believed other students think they are smart when they get a lot of stickers to add to the class chart. Both students indicated that when a teacher writes "good job"

on their papers it makes them feel good for a little while; however, they are not sure what they did a good job on.

Students 9 and 10 did not do anything with their papers after the teacher wrote comments on the papers. These two students had a variety of evaluative and descriptive feedback on their work. The majority of the comments were descriptive. Student 9 replied: "I don't know what to do because I cannot read my teacher's writing... I know she is writing stuff, but her writing is in cursive...I don't feel like her comments are helping me."

Student 10 revealed the same concern, but felt the comments were for her parents and not for her because the teacher didn't want her reading the comments. Student 10 stated: "I think she writes in cursive because... she does not want me to be able to read her notes to my parents...they must be good notes because my mom never says anything to me." The students noted that the information was useless if it was not able to be read (see Appendix H). The teacher's comments reflected a combination of evaluative and descriptive feedback (A1, B1, C2 and D1), and based on the analysis of the other two teachers who gave evaluative and descriptive feedback, her comments could have made an impact if the student could read the comments. The teacher indicated written feedback did not have an impact on student learning in mathematics due to her students' scores not increasing.

Teacher 5, who had a combination of evaluative and descriptive comments, was made aware of her students not using the feedback indicating that they were not able to read the comments due to being in cursive. Teacher 5 shared that she "had no idea and thought since cursive was a second grade standard and I teach fourth grade that all children knew how to read cursive."

Students Who Received Only Evaluative Comments

Students 11 and 12 from Teacher 6 believed written comments from the teacher made them feel good, and they liked getting stickers, but it did not help them learn. Andres and Pine (2012) revealed that encouraging self-evaluation encourages students to focus on improvement and stickers neither explain the error nor motivate students to take action because of the meaning of their value. Stickers are evaluative in nature because they do not indicate what was correct or incorrect. Both students noted that the stickers get placed on a chart in the classroom, and other students think they are smart. Both students felt the teachers' comments did not help them learn and sometimes it made them feel bad. Student 12 explained: "Sometimes I get a lot of things wrong and I would rather not show anyone my work...I try hard but it doesn't feel like I try hard when I see my grade." Student 12 indicated that "sometimes I do get things right and I will get a sticker, but that doesn't help me learn."

Eighteen out of 20 students felt that stickers, grades, and percentages were not helpful. Two of the 18 students (6, 7), who liked getting stickers and felt it did help them, explained that the stickers made them look smart to other students because they got to put their stickers on a class chart and it made other students think they were smart. When asked what they would rather receive besides stickers, 18 students replied that when the teachers write on their papers or conference with them, it is more helpful than giving stickers. Overall, students believed that written feedback that represents errors, next steps, or questions asking students to do something with their work would help them learn more.

Student 13, who received only evaluative feedback, discussed how much feedback his teacher gave him and he said he could tell how he did based on the amount of feedback that was written on his work. He said:

> When you do a good job and get everything right, you just get an A; but when you did badly, you get a lot of comments all over your paper. I sometimes don't show these papers to my parents. I sometimes try doing the problems again, but mostly I don't.

He stated that he puts his paper away quickly when he sees a lot of writing from the teacher because he does not want other students to see his paper.

After each interview, students were asked if they would like to communicate anything else about feedback and what works best for them. Some students indicated that written and oral comments are necessary for them to understand what they are expected to learn. Some students felt they only needed written feedback as long as they could write feedback to the teacher. All students felt for them to be successful, feedback must be given by the teacher and needs to be more than grades or stickers.

Findings

The multi-level analysis of the data involved coding of the teacher and student interviews transcripts, student work samples, homework, and assessments to answer the following research questions:

1. How does formative feedback influence student achievement in elementary mathematics?
2. What types of feedback are teachers giving students on formative assessments?
3. What are teachers' perceptions of giving formative feedback?

4. What are students' perceptions of receiving formative feedback?

Organized themes were based on the coding of the data. The themes from the teacher and student interview coding were: inadequate teacher understanding of the formative assessment process; inconsistent use of written descriptive and evaluative feedback; and inadequate understanding of student expectations.

The following section presents these findings and includes a synthesis of teacher and student participants' perceptions, as well as direct quotes which provides rich descriptions. The research questions, rich descriptions, and quotes are discussed in context of the conceptual framework and related to the literature review in Section 1. Additionally, the findings are organized according to each of the four research questions and the themes which emerged from the data analysis.

Theme 1: Insufficient Understanding of Formative Assessment/Research Question 1

How does formative feedback influence student achievement in elementary mathematics? Based upon the analysis of the teacher interviews, student interviews, and student data, descriptive feedback has an impact on student achievement if the feedback is descriptive, understood, and related to the concept that is being assessed; if the student has an understanding that he or she is supposed to react to the feedback; and if the feedback is legible. When these topics were in place, both teachers and students believed descriptive feedback had an impact on student achievement. Three teachers who used descriptive feedback said that they asked the students what kind of feedback helps them when they get something incorrect. Teacher 1 explained:

> My students commented that it would be nice to know what they did wrong and how to fix it. They said they sometimes get things wrong and they just have to accept the grade that they get. I explained to them that this year was going to be different and I want them to learn everything they need to know before they leave my classroom and go to the next grade. The students asked how I was going to do that and I told them I was going to be writing things down on their papers that I wanted them to think about, and then I wanted them to think, and try again. I wanted them to ask me questions and meet with me to discuss anything that they don't understand about what I wrote on their papers. I think talking to the students ahead of time really helped my students to know what to do.

Both teachers and students stated that oral feedback was given. Some students liked both oral and written; however, only when the same conditions applied (i.e. feedback is descriptive, understood, and related to the concept that is being assessed, if the student has an understanding that he or she is supposed to react to the feedback, and if the feedback is legible). On the final follow-up questions, students were asked if there was anything else they would like to share about what type of feedback they need. Student 5 commented:

> I write my teacher's comment down when I go back to my seat especially if there is a lot I need to think about when I re-do my work. I take the notes and I put them in my math notebook, so when I am studying for the test I can read over my notes to make sure I remember how to not make the same mistake.

Some teachers offered comments such as only giving oral feedback and that some students use the feedback and some do not. Perhaps having a process where students record the feedback and apply their thoughts to the assessment after trying the problems with the new information,

teachers can be certain that the feedback was helpful. This process has several benefits: the teacher can react to the notes to ensure the student understood next steps, ensures that the teacher addressed the concern, prevents learning gaps when students are missed, builds communication and relationships between teacher and student, provides a reminder to the student that a conversation took place, increases student awareness, and builds self-efficacy and student motivation. Wiliam & Leahy (2015) stated that formative feedback is only feedback if it is interpreted and used by the student to change the student's thinking from where he or she was prior to the feedback.

Formative feedback builds self-efficacy and student motivation (Bandura, 1993; Wiliam & Leahy, 2015). Students take action on what needs to be done and become motivated to understand. When Student 2 took the oral feedback and made notes, she became aware of what she needed to do, which is the essence of self-efficacy (Bandura, 1993).

Theme 2: Insufficient Understanding of Teachers Using Different Types of Formative Feedback/Research Questions 2 & 3

What types of feedback are teachers giving students on formative assessments?

What are teachers' perceptions of giving formative feedback?

All of the teachers interviewed discussed the use of formative feedback. All teachers indicated they had professional development, were part of a school-wide book study, or independent learning on the topic of formative feedback, and were familiar with the topic in some way. All teachers confirmed that they needed more support on the topic and they needed the opportunity to not only embed the process, but to evaluate how the students were reacting to the feedback. Teachers wanted to be supported by their administration and to have the

opportunity to work collaboratively with their peers to have a firm understanding of formative feedback. Teacher 2 communicated "I have been working on understanding formative assessment for 2 years through a grant and have been working independently as well because not all of my team is a part of the grant and this is the first year I have thought about how to engage students in the process." "Working independently is hard because you don't have anyone to question or give input to what you are doing." Teacher 1 shared, "I made formative feedback a part of my evaluation to ensure I get some feedback, but my principal does not have the background needed to support me." Teacher 4 shared "there are ways that we can work on this and get all faculty involved to get the support that is needed to make a difference with students." Teacher 6 stated:

> This is a school initiative as well and we are all trying to learn together, but this is not the only initiative. This topic is so big and all of the research that I have read shows that there is an impact on student achievement, so I think as a school we should have only this topic to research and work through.

All teachers stated that they needed support from their administrators and wanted to work on formative feedback as a school. Teachers wanted to be able to discuss the different types of feedback and see what type of feedback helped students. They wanted to look at student work and discuss what they should write as a team and then come back together to see what the impact was on the student.

The teacher participants seemed to be motivated by the idea of formative feedback and wanted to know more. Not only did this study cause students to become self-regulated, but teacher as well became self-regulated learners. Bandura (1997) believed the most effective way

of establishing a clear sense of self-efficacy is through experiences. Teachers need to have the opportunity to collaborate and build efficacy through school-embedded professional development.

Teacher participant comments included various levels of feedback according to FTC. One teacher, who gave only evaluative feedback, discussed the need to learn more about descriptive feedback. The FTC was used during the interview and when evaluating student feedback. Teacher 6 replied that feedback was not causing change on student learning. Teacher 6 commented:

> I know that I was only giving evaluative feedback, where students either felt good or felt bad about the feedback. I need to be more focused on what they need to do and that seems to be more on the upper end of this typology. I think that our team, or maybe the school, needs to focus on this topic and we need to get better as a school on understanding the impact of formative feedback.

Teachers need the opportunity to discuss their individual feedback and the impact on student achievement in mathematics. Killion (2015a) explained that professional development causes the greatest impact when it is content rich, and when it occurs during the natural setting. Teachers who teach mathematics are vested in the content; it matters to them, and therefore, they will be engaged in the experience.

Theme 3: Students' Inadequate Understanding of Feedback and Student Expectations/ Research Question 4

What are students' perceptions of receiving formative feedback?

Some students received lengthy written feedback on all work samples and others received very little. Some comments were descriptive in nature, telling the student what he needed to think about, and some feedback was evaluative, telling the student "good job" or giving smiley faces or stickers. All students believed that feedback was important and it showed them that their teacher cared about them. Many students believed that they wanted to make their teacher proud of them and that is why they read the feedback. Student 19 explained that,

> My teacher takes time to write all of this on my paper because she believes in me. I don't want to disappoint her and I want to do this for myself. I like meeting with my teacher after I make corrections because she sees that I am trying.

Many students felt empowered by the comments and one-on-one meetings with their teacher. Several students felt more comfortable with mathematics because of the feedback and having the opportunity to re-work missed problems. All students felt that when they were given an end-of-unit assessment they should not be allowed to change their answers after getting feedback. They believed this was cheating and the teacher expected the student to learn the content by the test date and it was the students' responsibility to learn the material. Student 16 stated, "my teacher thinks I should be able to do the work when she gives me the test and that is the grade that I get." "We don't get to go back on a test and change our answers." Student 15 commented, "it was cheating if we went back and fixed a test but it's not when we are doing worksheets and it is not being graded."

This is a paradigm shift for teachers and students. Stiggins (2008) suggested, grading is for learning, it is not done for the sole purpose of giving a grade. There is a traditional model of

grading and achievement that teachers and students understand. Therefore, teachers' and students' thinking must change to understand what grading should mean and how it impacts student achievement. Increased teacher knowledge and skills will cause change in teachers' and students' attitudes and beliefs if consideration of their role is a part of the process (Killion, 2015b).

Finally, Wiliam & Leahy (2015) stated that too much feedback is destructive (p. 128). The term that Wiliam & Leahy (2015) denotes is called bandwidth feedback. Bandwidth is a range of feedback that is given when students are doing well and a range of feedback when support is needed. For example, when students are doing well, they may or may not make a mistake. If this is the case, no comments are necessary. If a student has done poorly on an assignment, the teacher should not give feedback that corrects all of the misunderstandings, but rather direct feedback that supports next steps. When teachers give corrective feedback only, to all missed problems, then the learning is done by the teacher, not by the student (Wiliam, 2015).

Summary

As part of a case study, data collected through teacher and student interviews and analyses of student work were analyzed to answer specific research questions about the impact of formative assessment and types of written feedback from teachers that may impact student learning. The findings from the analysis helped to answer the research question about how formative feedback influences student achievement in elementary mathematics, as well as the sub-questions: (a) "What types of feedback are teachers giving students on formative assessments?" (b) "What are teachers' perceptions of giving formative feedback?" and (c) "What are students' perceptions of receiving formative feedback?"

Three sources of data were triangulated to capture the perceptions of the impact of formative feedback on student learning. Findings addressed how professional development on formative feedback was needed to support administrators, teachers, and students in order to use formative feedback more effectively. Teachers indicated that professional development on formative assessment with administrative support was important. Teachers believed that during the school day, with scheduled team collaboration, times needed to be in place to ensure continuity of professional development and be supported by the administrative team. Professional development with a focus on types of formative feedback needed to be a part of the training. Teachers shared that student expectations needed to be a part of the training to ensure students were a part of the learning.

This study was conducted to understand if specific formative feedback had an influence on student achievement and to determine teachers' perceptions of giving feedback and students' perceptions of receiving feedback. The key research question was "How does formative feedback influence student achievement in elementary mathematics?" Based on the results of the study, teachers' and students' perceptions suggest some effect on student learning may have come from specific types of descriptive feedback; however, due to the nature of the research design there can be no conclusion about to what extent descriptive written formative feedback may have been a factor in increasing student learning.

Descriptive feedback according to Gipps et al. (2004) feedback typology reflects the four different components of effective feedback that increases student achievement. Level 4 includes C1: Specifying attainment, C2: Specifying improvement, D1: Mutual construction of achievement, and D2: Mutual construction of improvement. Descriptive levels represent

teachers telling students what they are doing right and what they are doing wrong and describing why the answer is correct, as well as telling students what they have and have not achieved.

Also, sub-questions that guided the research were (a) "What types of feedback are teachers giving students on formative assessments?" (b) "What are teachers' perceptions of giving formative feedback?" and (c) "What are students' perceptions of receiving formative feedback?" The types of feedback that teachers gave to students varied and ranged from all levels of evaluative feedback to all levels of descriptive feedback. Based on teachers' perceptions, professional development is needed to implement and sustain an understanding of formative feedback. Students' overall perception of receiving formative feedback is that they know if they receive descriptive feedback they have a better understanding of how to change their thinking to meet the end learning goal that the teacher has set forth. Third, fourth and fifth-grade students realized that stickers and grades did not support their learning needs. They needed to know what their next steps in the learning progression were based on and where they were currently. Overall, students wanted to please their teachers and they wanted to be able to correspond with their teachers to meet the stated objectives.

Researchers see formative assessment as one of the most important factors affecting students' learning and certainly one that teachers have control over. Teachers need professional development to ensure they understand the impact of formative feedback as well as implementing formative feedback practices. By having an understanding of formative feedback, teachers will be able to specify the type of written feedback given to students in mathematics and determine what types of feedback increase student learning.

Section 3: The Project

Introduction

Section 3 provides a description of the written formative feedback project created to address the findings gained from the research conducted in mathematics classrooms in two elementary schools in Virginia. In this section, I explain the purpose, goals, learning outcomes, and target audience of the project. Additionally, I include a rationale for the genre, design for the project, and review of the current literature that guided task development. The project was based on the analysis of the study investigating written formative feedback and the perceptions of teachers and students in Grades 3, 4, and 5 in mathematics instruction. The design of this case study focused on determining the strategies and rationale that teachers have for implementing formative feedback in mathematics. The project was developed to provide professional development based on input from teacher participants to address training needs in the area of formative assessment. The professional development and the evaluation of the project were developed based on current literature review findings to improve teacher sustainability and increase student achievement with the implementation of written formative feedback.

The foundation for the project supports the research questions.

The main research question was as follows: How does formative feedback influence student achievement in elementary mathematics? The data analysis for the study identified three themes: insufficient understanding of teachers using different types of formative feedback, inadequate understanding of student expectations in using formative feedback, and deficient professional development to sustain new learning. Teacher participants claimed that their understanding of formative assessment was

reliable in determining the difference between formative and summative; however, when involving students and giving accurate formative feedback, they felt that support was needed. Six of the 10 teacher participants believed that student achievement increased when they gave feedback. Four of the 10 teachers believed that there was no improvement in student achievement when they gave students written feedback. The types of feedback given to students varied in these two groups of educators. Therefore, the provision of professional development that supports understanding of the type of feedback given is an objective in the project.

The first subquestion that guided the research was the following: What types of feedback are teachers giving students on formative assessments? The data analysis identified two themes: Students were given multiple types of written feedback, and teachers lacked understanding of formative feedback. Students received feedback that ranged from A1—Evaluative to D2—Descriptive. Teachers did not have a way to determine the types of feedback given to make the feedback purposeful. The project was designed to help teachers build an understanding of the different types of formative feedback and to analyze comments they write on student work. The goal of the project is to allow teachers to collaborate with grade-level peers and to support one another when learning new concepts (Andree, Richardson, & Orphanos, 2009; Darling-Hammond & Wei, 1995). Formative assessment is a cyclical process between student and teacher (Heritage, 2010; Wiliam & Leahy, 2015). The project uses a framework from Wiliam and Leahy (2015), and Heritage (2010) to give teachers an understanding of the feedback cycle and the roles of teacher and student.

The second subquestion that guided the research was the following: What are teachers' perceptions of giving formative feedback? The data analysis identified two themes: professional development on types of feedback, and professional development on who should receive written feedback. Teachers stated that there was a need for professional development because they were unsure what written formative feedback looked like and how to direct the feedback to the goal and give students next steps. Teachers believed that the process for written feedback was arduous and were not sure that they could provide feedback to all students. The project goals encompass understanding the impact of written feedback and how to manage who will receive intensive written feedback. Year 2 focuses on choosing students to receive specific feedback. Written feedback is time consuming, and teachers will not be able to give this form of feedback to all students. Teachers will begin to look at written feedback as a Tier 2 or Tier 3 intervention and will not be giving more than 5%-15% of their class scripted feedback (Gansle & Noell, 2007).

The third subquestion that guided the research was the following: What are students' perceptions of receiving formative feedback? The data analysis identified three themes: Students believed that written feedback was useful and supported their understanding, students wanted to give written feedback, and students believed that stickers and smiley faces were not helpful in increasing learning. Students felt that when teachers' written feedback included hints or next steps, it was useful, but when the feedback took the form of a percentage, a grade, or stickers, it was not helpful. Some students thought that the scripted feedback should be written in a manner that ensured that they could understand what the teacher was saying (i.e., it should not be in cursive

and should be in complete sentences). All students believed that it would be helpful to their learning to give feedback on homework or classroom assignments if they did not know how to do something, in order to gain help before the task was given a grade. Many students deemed it unfair for students to ask questions on a test because students should know the information by the time they take the test. The issues and perceptions of the teachers and pupils that were uncovered by the research formed the foundations for the project, which will address the participants' need to understand and implement formative feedback consistently to impact student achievement.

Description and Goals of the Project

Professional development (PD) will provide elementary teachers a focus on pedagogical strategies that can be used to improve the implementation of written formative feedback in their mathematics classrooms to increase student achievement. The project that was based on the results of the study is a professional development training manual titled *Written Formative Feedback: Improving Student Achievement and Doing What Is Best for Students in Mathematics*. The manual might serve as a model for other school districts and give educators practical strategies for understanding the types of written formative feedback needed to impact student achievement in mathematics. The manual includes three modules. The suggested timeline for each module is 1 year. Each module includes an overview, goals and learning outcomes, facilitator slides, handouts, suggested text to purchase, self-evaluations, specific readings, essential video clips, and group evaluations.

Most teachers across divisions attend half-day or full-day workshops throughout the year, either to earn recertification points for licensure renewal or because they have

an interest in learning more about a topic. The extent to which content from these workshops carries over into the classroom is difficult to determine because of the number of educational choices teachers have and the lack of research on how much PD supports change in classroom instruction. However, there is research that supports the idea of PD being most beneficial when there is follow-up throughout the year and there are collaborative discussions concerning the topic of the PD over a consistent time period (Sharma, 2016; Stevenson, Hedberg, O'Sullivan, & Howe, 2016; Yoon, Duncan, Lee, Scarloss, & Shapley, 2007).

Administrators release teachers to attend in-services that may or may not be relevant to the teachers' professional development needs. There is seldom follow-up from the professional development revealing an impact on teacher instruction, much less student achievement (Sharma, 2016; Stevenson et al., 2016; Yoon et al., 2007). There is a lack of PD opportunities for principals on new initiatives that teachers bring to the classroom. Additionally, principals need to be able to meet the learning needs of teachers, who are responsible for the learning needs of all students (Zepeda, Lanoue, & Jimenez, 2014). For these reasons, PD includes both administrators and teachers and allows these stakeholders to build understanding together (Robb, 2000).

Goals and Learning Outcomes

The study supports the implementation of professional development (see Appendix A). The goals and learning outcomes for Module 1 of the project are as follows: understand what formative assessment is and is not; know that formative assessment is a process, not a thing; and apply the different types of formative feedback

using the Gipps et al. (2004) feedback typology. Module 2 goals for teachers and administrators are to be able to analyze different types of feedback and determine what type of feedback one gives to students in mathematics. Finally, the Module 3 goal for administrators and teachers is to create a plan for implementation in the district, school, or classroom.

Teachers indicated in the study that even though they had an opportunity to attend workshops or 1-day in-services, they felt that they were working independently and needed support from their teams and administrators to increase sustainability. Robb (2000) claimed that a one-size-fits-all presentation with minimal administrative support and lack of follow-up support throughout the school year will result in little to no change in teachers' instructional practices. The design of this project provides an incremental process for administrators and teachers addressing the importance of job-embedded professional development (Corcoran, 1995; Reeves, 2010). The project focuses on team collaboration due to the importance of teachers sharing, reflecting, and giving one another feedback throughout the collaborative process (Horn & Little, 2010).

Timeline

The timeline for the project includes 3 days of the initial professional development, as well as follow-up during professional learning/grade-level team meetings. Year 1 provides the foundation for understanding the content and application of skills. In Year 2, teachers will continue to apply skills; however, they will begin to understand the impact and focus on student achievement. In year 3, teacher teams and administrators will design a plan for sustainable implementation in the classroom and will address how to evaluate the effects of formative feedback.

The first year will begin with 3 days of professional development that will be provided to all stakeholders, including teachers and administrators. The Year 1 focus will be building foundational skills, and the focus of Year 2 will be the application of the skills learned. Grindal, Hinton and Shonkoff's (2012) research indicated that when real understanding occurs, sufficient time for learning needs to elapse before teachers are expected to perform; therefore, 2 years of professional development with a concentration on the foundation and application in the second year will increase the probability of sustainability and implementation. The training will take place every 2 months for the first year, with collaborative team planning each month. To ensure sustainability, teachers will continue to meet monthly after the first year.

The second year will focus on implementation and student selection. The project describes goals that each of the teachers and administrators should meet by the end of the 3 days. The 2-year professional development training allows teachers to build a sound basis for understanding the formative assessment framework and developing an in-depth understanding of written formative feedback.

Year 3 includes a process for schools to begin to create a plan to ensure sustainability. The project includes a research guide from the Alberta Education Partners (2010) that lays a foundation for creating a plan for implementation that includes all stakeholders. After the plan is created, the project timeline is inserted into the program and is monitored for the next 2 years, with various checkpoints within the modules.

The overall objectives of the professional development are to increase teachers' knowledge about the process of formative assessment with an emphasis on written feedback, to support teachers' implementation of the process of formative assessment in

the classroom, and to build administrative understanding of formative assessment that allows them to support teachers. The project includes materials such as the facilitator's guide, research, evaluations, and handouts to provide teachers with the background information needed to implement formative feedback with fidelity in their classrooms.

Format, Content, & Activities

The format, content, and activities are based on Desimone's (2009) conceptual framework, included in the project in Appendix A. To ensure that the professional development transfers into the teachers' classroom, teachers need to be a part of the planning, execution, and monitoring of the training. This project includes 3 full days of training and monthly collaboration meetings for 2 years, resulting in 53 contact hours for teachers and administrators. The initial 3-day PD consists of teachers and administrators in a face-to-face setting engaging in dialogue while working through the PD manual. The focus of the first 3 days is building a foundation for understanding formative assessment and creating an action plan for sustainability.

The first component of Desimone's (2009) meaningful professional development is ensuring that content is specified. Professional development will be applied to mathematical content. Specific activities have been designed to allow teachers to collaborate and make connections to student achievement.

The second component, active learning, is embedded in the professional development for teachers and principals to analyze teacher comments. Stakeholders are involved in a collaborative process in which all members are responsible for giving feedback to one another to build understanding of the different types of feedback. During

Day 2, participants will have the opportunity to bring student work on which they have given feedback, and other group members will use FTC to analyze their feedback.

On Day 3, participants will be engaged in the area of coherence, the third component of Desimone's (2009) framework. Based on the professional development they have received, participants will create a plan that outlines specific goals and activities, is consistent, and aligns with the professional development modules. All stakeholders, including teachers, administrators, and math specialists, will be involved in creating the professional development plan.

Desimone (2009) described the last component of the framework as collective participation. Participation from all participants allows schools to have professional learning communities at grade levels or vertical teams that focus on goals set by the professional development plan for implementing written formative feedback. It is the expectation that administrators are provided training at the district level to support teacher learning and ensure that schedules meet the demands of the teams' collaborative planning.

Stakeholders

Based on the conclusion of the study and teacher interviews, each school using the professional development training modules should begin with a plan of implementation. Reeves (2010) stated that a high-impact professional learning environment is present when all stakeholders are involved in the decision-making process. At the end of the 3-day professional development, teachers and administrators will create a professional development plan specifying dates and times to allow for collaboration. Stakeholders should include all teachers who teach mathematics, along

with school- and district-level administrators. Stakeholders will begin by creating a vision as well as an implementation plan that includes the characteristics of successful implementation (Loreman, 2010).

Rationale for the Project Genre

The overall genre of this project is professional development. Ideally, professional development should be ongoing and should be conducted during the school day to ensure transfer into the classroom. This project was constructed based on current literature, teachers' experiences self-reported through interviews, and students' experiences reported through interviews. The analysis provided in Section 2 of this study suggests that teachers and pupils believe that written feedback is a valid means to increase student understanding and student achievement. The teachers who participated in this study had been working on understanding the importance of using written feedback in the classroom; however, due to lack of professional development and supervision, they did not have the necessary skills to implement written feedback effectively. The project will provide school leaders a foundation on which to build a strong professional development plan based on formative feedback and to implement formative assessment practices in the classroom with sustainability. Teacher participants expressed a belief that administrative support is a vital component sustaining any professional development effort; therefore, this study will include both teachers and administrators (Robb, 2000).

Teachers and administrators working together on understanding and applying best practice in the area of formative assessment may experience benefits from three areas: collaboration, peer reviews, and group evaluation. When stakeholders begin with a collaborative design and discuss specific formative feedback along with student

achievement, there are direct gains in teacher understanding (McTighe & Thomas 2003). Focusing on student assessments causes the teachers to become connected to the discussion and results (McTighe & Thomas 2003). The project expectations include team collaboration throughout the 2-year process.

During collaborative team meetings, a peer review process should take place. Specific protocols should be in place during the team meeting (see Appendix A).The discussions will be performed around Gipps et al. (2004) feedback typology. Specific roles will be assigned to the group members. The task keeper will distribute the FTC, the communicator will review the typology at the beginning of each collaborative planning meeting, and all other members will give feedback, as well as indicate how well the student is performing based on the teacher-given feedback. All members will then reflect on the feedback compared to the typology on the reflection sheets.

Finally, the last component is group evaluation. Each group member will have an opportunity to present for two minutes, while others take notes and compare against their reflection. Then the reporter will summarize suggestions from the participants and give the documentation to the teacher who initially shared their feedback. At the next meeting, each teacher will communicate any changes they have made based on their new understanding. The teacher will also begin the cycle of sharing the feedback given to students and a summary of student achievement.

Review of the Literature Addressing the Project

The first literature review included a conceptual framework for formative feedback and the formative assessment process. The literature review emphasized student outcomes regarding written formative feedback and the formative feedback process

(Wiliam, 2011). The literature stressed that regardless of its benefits, formative feedback related to assessments, homework, and daily assignments is still not a standard practice in the classroom (Black & Wiliam, 1998a; Hattie, 2011; Wiliam, 2011). This first literature review presented written formative feedback as a possible tool to help teachers implement formative feedback strategies effectively (Wiliam, 2011). The second literature review is based on professional development and the implementation of sustainable professional development regarding formative assessment. The research will include current best practices for formative assessment practices in the classroom and reveal best practice to sustain PD.

To find relevant literature, I searched Google Scholar, Academic Search Complete, Educational Research Complete, Educational Resource and Informational Center. The Boolean search terms I used while searching for related literature included: *teachers' professional development, sustainable professional development, district implementation, high-quality professional development, professional learning community, and administrative support*. Overall identified patterns and themes from the search were: a need for sustainable professional development, teacher collaboration, and administrative support.

District Implementation and Sustainable Professional Development

An initiative on formative assessment has been prominent in the district for about three years; however, there was no plan in place for successful implementation. All schools in the district are not involved in professional development that supports the initiative. The implementation guide from Alberta's Education Partners (2010), has been proven to support school districts with concise steps that will increase the likelihood of

the professional development to be sustainable. As with all initiatives, a plan for implementation should be created by stakeholders that may be involved or have an impact on during the implementation of the professional development. Stakeholders should be a part of the planning, evaluating, and peer review (Killion & Hirsh, 2011; Reeves, 2010; Zepeda et al., 2014). School-based professional development is referred to as organizational learning (Avidov-Ungar, 2015). Avidov-Ungar claimed when teachers are personally involved then there will be a willingness to adopt the professional development.

Professional development has little to no impact if it is a 1-day presentation (Darling-Hammond et al., 2009; Sharma, 2016; Stevenson et al., 2016; Yoon, et al., 2007). Discrete topics that are not based on best practice or support a district initiative have a minimal transfer in reference to changing teachers' instructional practices or results in student achievement (Cohen, Raudenbush & Ball, 2001; Earley & Porritt, 2014; Kulinna, McCaughtry, Martin & Cothran, 2011). The reason for this type of impact is due to the design of the training (Polly, Wang, McGee, Lambert, Martin & Pugalee, 2014; Wong et al., 2015). Training should be embedded into the school day and occur throughout the year (Cohen et al., 2001; Dever, Lash, 2013; Sharma, 2016). Over 40 hours of professional development per year is suggested for sustainability (Antoniou & Kyriakides, 2011; Yoon et al., 2007). Although there is no exact number of sufficient professional development hours, there is growing research on how peer collaboration has an impact on teacher instructional practices (Desimone & Garet, 2016; Horn & Little, 2010).

High-Quality Professional Development

The content is linked to the training, it is content specific (mathematics), and aligned with the skills that students must learn, understand, and do (Kennedy, 2016; Killion, 2015b). Cohen et al. stated that the content should be aligned with the training, state standards, and skills. The three-day training builds the foundation of formative assessment in the area of formative feedback as well as embeds classroom observations during the school year for all participants, video and audio feedback, and practice time for teachers to master the art of giving descriptive feedback in mathematics.

Teachers and principals are the essential components of the study who will work collaboratively as a professional learning community in a school setting (Bannan-Ritland, 2008). School administration will also be provided professional development separately from the teachers to ensure support when creating schedules and to ensure leadership needs are met (Allen & Penuel, 2015; Zepeda et al., 2014). The trainings foundation is built on a three-day training cycle; however, additional discussions will occur throughout a two-year process to ensure fidelity of the professional development, impact on teacher instruction, and impact on student achievement. Teachers will have the opportunity to problem solve and determine the types of specific formative feedback needed to increase student achievement through peer observations and follow-up discussions. Teachers will provide videotaped responses of giving feedback as well as submitting documents for peer review with written formative feedback. Finally, teachers will use a feedback typology to determine the different types of feedback and have discussions with peers on how to provide explicit descriptive feedback based on FTC.

During teacher interviews the teacher participants indicated there was inadequate professional development in the school and district for support with formative assessment. Professional development should be meaningful to teachers and sustainable within the district. The conceptual framework designed by Desimone (2009) suggests that there are five components of meaningful professional development. The five elements, according to Desimone are: content focus, active learning, coherence, sustained duration, and collective participation. The ultimate goal of training is improving student achievement (Whitworth & Chiu, 2015). Professional development should result in a belief to change teaching practices that influence student achievement (Correnti, 2007; Desimone, 2009; Desimone & Garet, 2016).

The fourth area from Desimone sustained duration, is based on the division, school or team's plan. It is not acceptable or advantageous for the professional development to end after the third day. Desimone and Garet suggested the professional development that is extended throughout the school year and includes 20 hours or more of direct contact with the participants will have a lasting impact that meets the expectation of the goal(s).

Implementing formative feedback in the classroom can be challenging, primarily due to time constraints and understanding the concept of formative assessment (Wiliam, 2011). Many teachers look at formative assessment as a test or instrument that is given more often than other types of assessments (Black, 2008; Chappuis, 2009; Heritage, 2011; Wiliam, 2009). Teachers need ongoing professional development to incorporate formative assessment strategies into their daily instruction (Heritage, 2010). School districts need to provide teachers with ongoing professional development on formative

feedback to support an in-depth understanding of the formative assessment process (Loucks, Stiles, & Mundry, 2010). The success of the implementation of formative feedback depends on teachers learning how to apply descriptive feedback to specific needs based on student understanding and then follow through to check for understanding by the student (Henry & Weber, 2016).

PD can have a great effect on teacher instruction and student learning through a professional learning community (Mindich, Lieberman, 2012; Soine & Lumpe, 2014). Research has found that productive PLCs are related to teachers' professional growth and may enhance student learning (DuFour, DuFour, Eaker, Many, & Mattos, 2015; Svendsen, 2016). Joint learning, collaboration, and teaching educators to learn in groups may reinforce the idea of organizational learning (Avidov-Ungar, 2015; McMahon, Peters & Schumacher, 2014).

Professional Learning Community

Finally, the concept of professional learning community (PLC) is the foundation that needs to be in place for teachers to be successful (DuFour et al., 2015; LeClerc, Moreau, Dumouchel & Sallafranque-S-Louis, 2012; Little, 2012). For more than two decades, teachers who have been a part of a consistent and productive PLC have found more effective ways to effectively teach and support student learning (Little, 2012; Trust, 2012). Ensuring that all students learn is the first big idea of a PLC. The first big idea in forming a PLC is creating a vision (Carpenter, 2015; Little, 2012; Stoll & Temperley, 2009). The vision is in the center of the design. The culture and belief that all students can learn and will learn needs to be at the center of the school's vision statement (Flanigan, 2012). School staff needs to take this statement and believe it, not just write it

as their vision (DuFour et al., 2015). Teachers need to collaborate and discuss every student. They need to know where each student is academically and emotionally (DuFour, 2004). DuFour stated that all staff should believe that all students belong to all staff. Having a collective responsibility for all students is an essential part of the school's vision (DuFour et al., 2015).

The second big idea according to DuFour is creating a collaborative culture. This process includes sharing of ideas and in-depth discussions about best practice with an overall collective commitment from all members (Little, 2012). In a PLC, teachers understand the importance of working together to achieve a collective goal for all learners (Tam, 2015). Little claimed peer feedback and collaboration improves instructional practices. School leaders need to ensure a collaborative environment is in place, and teachers need to reflect on their role in the collaborative community (Hairon, Goh, & Chua, 2015). A rubric designed for teachers to reflect on their own practice is included in Appendix A, as well as electronic reflections that will be shared as part of the PD. Collaborative design and peer review improve teacher expertise and teacher competence (LeClerc et al., 2012; Little, 2012; McTighe, 2003; Tam, 2015).

Adequate support from administration is a component to ensuring sustainability of a collaborative vision (DuFour, Marzano, 2011; Thornton & Cherrington, 2014). Research confirms that leadership has a powerful effect on student achievement (Hirsh, 2015; Van Lare & Brazer, 2013). Supportive administration brings stakeholders together to establish a vision for high-quality instruction (Hirsh, 2015). PD that is agreed upon based on the needs of the teachers and school districts necessitates monitoring and support. The decision-making process should involve all stakeholders, and all

stakeholders should be a part of the solution (Ermeling, 2010). Reed & Eyolfson stated that teachers matter in this process. One of the key processes that Read & Eyolfson put into place that showed teachers that they matter was allowing teachers to be a part of the process when collaborating on understanding and an ownership of the specified initiative.

Administrators must ensure that release time is part of the school day to support teachers when they are learning something new (Ferguson, 2013; Goldenberg, 2004). When teachers collaborate on new ideas and begin to make sense on how to apply new strategies in their classrooms, the impact on student achievement is much higher than without collaborative planning time (Gallimore, Ermeling, Saunders, & Goldenberg, 2009). Educators should work collaboratively to ensure each member of the PLC is taking a collective responsibility for student learning (DuFour et al., 2015).

The last big idea from DuFour & DuFour (2012) is focusing on results. Student data is a critical component to discuss at every PLC. Sustained PD for teachers may have an impact on student understanding (Killion, 2015a; Williams, Ritter, & Bullock, 2012). The discussions revolve around students' strengths (DuFour, 2004). Overall, all staff are involved in the decision-making process to do what is best for students. Collaboration during this final stage of professional development allows teachers to focus on student results. Throughout the training student perception will be analyzed to determine the impact on student achievement. Considerable time needs to be given to students to understand if the feedback is helping them learn. Teachers and students will be required to reflect on students' perceptions as they impact student achievement.

When school leaders have established a culture that is based on a shared vision, collaboration, and mutual goals, then a productive PLC will be in place. The foundational

components of a PLC are embedded in the project (see Appendix A). School leadership is a vital component in supporting leadership teams. The individual grade level teams as well as vertical teams will need to focus on the written, taught, and tested curriculum and determine where students are in their learning. Creating common formative assessments and providing feedback to students again will support teacher instruction and student learning (DuFour et al., 2015).

Summary

School systems throughout the United States have been seeking techniques to increase student achievement to meet the ever-increasing standards and benchmarks initiated by the federal government and individual localities. High-quality professional development is critical for districts to cause change that affects student achievement (Desimone, 2009). There has been a focus on formative assessment in education for over 40 years (Leahy & Wiliam, 2015). Research has shown that formative assessment is a high-yield strategy that improves student achievement (Hattie, 2012). A professional development plan based on this study that explicitly walks staff through a process that allows them to focus on formative feedback will be cost-effective and has the potential to increase student achievement.

Administrators and teachers will understand the importance of formative feedback and understand their role in the process when they see the impact on student learning (Besser & Blum, 2012). Through high-quality professional development, in a well-developed PLC, teachers will see the impact of written formative feedback and understand that it is not about the assignment, the assessment, or the homework practice; it is about the approach to teaching and learning. The success of implementation depends

on the teacher being able to identify what students need to improve understanding and then give descriptive feedback that allows the students to understand next steps that need to be taken to reach toward mastery of the goal (Marsh, Bertrand & Huguet, 2015). Overall, high-quality professional development will ensure implementation success for all teachers and may result in improving student learning (Bradley, Munger & Hord, 2015).

Resources Needed to Implement the Project

Enabling professionals to successfully change their current practice is a formidable challenge for themselves and the school district. Professional development of any type should consist of a precise plan of implementation to alter the culture of a division. District-level personnel and teachers should collaborate and create a strategic plan for formative assessment implementation. Defining who the stakeholders are and creating a committee that understands the importance of formative assessment and building a vision aligned to division expectations and goal (see Appendix A). Consideration should be given to time and monies necessary for teacher requirements as part of the discussions held with all stakeholders.

Leadership from administrators is critical. Providing professional development to district administrators before teacher leaders is essential to sharing the vision and getting administrator feedback and commitment. School administrators should have buy-in to support teacher growth. Teacher commitment must be discussed and determined before professional development implementation.

Other resources divisions will find crucial to consider are the materials such as electronic slides printed for teachers or materials that may be added to personal drives.

Coordinators to present materials may be the administration at each building or could be district level personnel. Some materials must be laminated for use throughout the three-year training. Overall, time and scheduling will be most valuable in ensuring the PD transferred into instructional practice.

Problem-to-Project Relationship

During the teacher interviews, teachers suggested that formative assessment practices are often difficult to execute due to time or knowledge constraints. This project has been designed with consideration to address both components. Embedded professional development into the school day will support teachers when moving towards full implementation. The project is designed to take place during the school day when common planning time has been established. It may also take place during faculty meeting or grade-level professional learning communities. Three days of focused professional development and continued daily professional development throughout the next 2 years will be necessary to ensure sustainability. Teachers are given teacher work days that can be used for professional development. On these days, students are not present, therefore, there is no cost to the school district or division.

Finally, the project has been designed to give districts all of the necessary research and materials to implement effective formative assessment professional development. Research from the study and online resources have been listed in the project for school use. Formative assessment and formative feedback from teachers is not new, but how to effectively give descriptive feedback needs to be a part of an ongoing plan (Heritage, 2010).

Existing Supporters and Potential Barriers

The strongest supporters for the implementation of formative feedback are the teachers in the study who could see the results. The feedback from teachers using formative feedback at any stage is overwhelmingly positive. Teachers who are seeing the results can provide valuable feedback on what they have done to implement written formative feedback in their classrooms.

Funding, time and commitment to change are the three barriers that districts face when implementing a new initiative. Teachers and administrators want to do what is best for students. Each of the three barriers can be overcome by well-planned professional development, a solid vision, and leadership that supports the initiative.

Project Evaluation

The project evaluation is based on Guskey's (2000) principles for effective feedback and Killion's (2008a) three components of evaluation. Guskey (2000b) and Killion (2008b) stated there needs to be a clear focus on learning and the learner. For this reason, the professional development project in Appendix A focuses on teacher collaboration and student work. Each module will address the central goal of increasing understanding about formative feedback and includes all stakeholders.

The second component that Guskey and Killion expanded on is the emphasis on individual and organizational change. The project includes daily evaluations for each module and peer feedback during the three training days, and a pre- and post-survey for all participants of the professional development. The survey questions focus on implication for change of self and organizational change. Overall results of the survey

will be compared at the end of the 2 years to create next steps or to ensure that formative feedback is a part of the school culture.

Small changes and ongoing professional development are a part of successful programs and a part of the project study. After the 3-day professional development, teacher teams will create a professional development plan that will increase the likelihood of the training to be a part of the school's culture. Incremental change and a focus on the vision of the professional development creates a positive change when all stakeholders focus on best practice of teaching and learning (Guskey, 2000a; Killion, 2015a).

Qualitative results will be monitored through PLC minutes and quantitative results will be monitored in the student data dashboard at each school. A collection of feedback will be documented qualitatively and FTC will be used by teachers to determine the types of descriptive feedback and how it was applied to the specific math concept. Teachers will conference with students and have students begin to set learning targets and goals based on the feedback given to students. Professional development only has sustainability if teachers are a part of the learning and student achievement increases.

Project Implications

Social Change and Recommendations for Practice and Future Research

Formative assessment and feedback in education play a critical role in increasing student achievement results. Recommendation and practice for future research will be based on the results of the project's survey and the outcome of the effect on student achievement. The professional development modules may be used in other districts to build the capacity for teachers and administrators in the understanding of formative feedback.

Future research may be extended to other content areas and at different grade levels to ensure validity. Online courses for professional development in the area of formative feedback may be developed to reach more school divisions. Finally, lesson studies can be created based on outcome of the PD manual training and shared with other school divisions.

Local Community

Administrators will be provided professional development on written formative feedback. Continued focus on formative assessment and research-based information will be provided along with this study. Information will made public through the district's website as the district continues to provide professional development for formative feedback and the practice of formative assessment.

Far-Reaching

The United States has focused on achievement with an emphasis on testing. Professional development on the concept of formative assessment and written feedback will allow school districts to increase teachers' understanding and, more importantly, may increase student achievement. Teachers can independently study to build their understanding without any cost to the teachers.

Conclusion

Section 3 described the project and research that supported the professional development manual. The purpose of this project was to develop a product that can be used to support teacher understanding of formative feedback and build teachers' capacity for implementation. Continuous professional development on the topic of formative assessment with an emphasis on teacher and student feedback is essential to improving

student achievement according to Reeves (2010) and Desimone (2009). The project has an emphasis on written feedback in the area of elementary mathematics; however, Gipps et al. (2004) feedback typology may be generalized to other content areas and any grade-level students.

Following an analysis of the study, a professional development manual was a seamless connection to address the gaps in participants' practice. The professional development manual also serves as a means to build a positive school culture by collaborating with all stakeholders on specific details such as when the professional development will occur, a schedule that allows the professional development to be job-embedded, and finally, lasting 2 years to ensure sustainability. The professional development manual provides suggestions as to possible methods of implementation, which aligns to the evidence in the research literature. The design of the project was developed to meet the needs of the district where the study took place; however, the contents of the model can be transferred to other localities.

The following section describes a reflection of the overall doctoral project research. Section 4 includes an analysis of the project's successes, limitations, and a reflection of my personal growth as a result of completing this work. It also includes considerations for any future study for creating change. The impact of overall change has been described in Section 4 to allow the reader to know, that without change in thinking, and in the current practice, the results will be the same. Change is not an easy task, and Section 4 includes some of the characteristics districts may face during this process.

Section 4: Reflections and Conclusions

Introduction

This study was designed to discover what type of written feedback teachers give and what type of feedback students need to improve their learning. A feedback typology was used to determine whether written feedback was descriptive or evaluative. The feedback typology allowed for an in-depth look at multiple types of descriptive feedback and multiple types of evaluative feedback. Teacher and student perceptions were ascertained through the use of face-to-face interviews with teachers and students and an in-depth look at student work samples. Recommendations for future research and the implications of the study are presented in this chapter. This chapter also includes a summary of the strengths, limitations, and weaknesses of the study.

Professional Development Project Strengths

In reflecting on the strengths of the professional development manual, I see this work as accessible and user friendly for school divisions. This project focuses on specific written feedback given to students on math assessments, class assignments, and homework in an elementary setting. The strengths of the project include its potential to promote teacher growth and student achievement in mathematics.

Professional developments provided to teachers throughout the school year as well as a 3-day in-service on this topic will allow teachers to practice, implement, and sustain change (Desimone & Garet, 2016). Teachers are no different from students when learning something new. Practice time and reflection on how the PD will become a seamless part of their classrooms will take more than 3 days. For this reason, the PD is

prescribed over the school year (Desimone, 2009). With budget always being an important component of PD, this project is inexpensive for school divisions.

Limitations will vary among teachers and schools; however, one limitation that most teachers will face is managing the new PD and implementing the concept of formative feedback in their classrooms. Again, time and discussion will be required to ensure the validity of the process. Another limitation may be buy-in from all stakeholders. Finally, scheduling time for teachers to meet as a professional learning community may be a limitation that schools may face. Having teachers meet during the school day is optimal; however, having teacher teams meet at a time that is convenient for them is also an option. Both scenarios are options, but they should be discussed with teachers to ensure that they know the expectations and can work within the parameters.

Recommendations for Remediation of Limitations

The study involved only teachers and students; however, the project should involve numerous stakeholders such as teachers, students, school- and district-level administrators, and parents. The professional development that is designed in the project does not provide training for students. Students are a key component of the effort to apply formative feedback. Students should therefore be part of the training. The teacher's role is to provide students with an understanding of why they are receiving feedback on their work. Being explicit with students is necessary when it comes to feedback. All learners, whether they are children or adults, want to know why, and sharing expectations can support students and teachers in making this process relevant.

Another recommendation for the remediation of limitations is sharing expectations with parents. Traditionally, parents expect to see a letter grade or percentage

on their child's work. This project involves a paradigm shift that may require teachers to provide research on why this process will look different from what parents traditionally understand. This process can be explained at back-to-school events such as parent night, or at other school events.

Finally, at the district level, school board members should be aware of the initiative and the expected outcome of the process. They may face questions and need to be apprised of the vision and the process that schools are adopting during implementation. Successful implementation requires a significant amount of time in planning; however, the reward is student understanding and awareness of their learning process.

Scholarship

An extensive literature review was conducted related to achievement and formative assessment with a continued emphasis on formative feedback. Through Walden University's course work, I became familiar with the process for collecting and analyzing data. Through the support of Walden University's faculty, I was able to build my skill level in conducting research. There were many challenges in my doctoral study. The amount of literature on written formative feedback in the area of mathematics was limiting; however, for over 40 years, formative assessment has been thoroughly researched. Discovering that there was limited research on written formative feedback in mathematics gave me the opportunity to research this topic. My content knowledge regarding formative feedback and written formative feedback in the area of formative assessment has grown immensely as a result of entering Walden University. As an outcome of my study and my work at Walden University, this process has truly been one

of the most transformational experiences in my educational career. Next steps in reaching other educators include presenting the project at district, regional and state-level conferences.

Project Development and Evaluation

The research process of taking a problem that exists in one's district and researching it using teachers and students from that district has made an impact on how I view research. This transformational experience has given me aspirations to broaden my study into other content and multiple educational levels. A project study is about putting theory and research into action as well as pursuing one's desire to know more.

Evaluation of the project will ensure that the goal has been met; therefore, the project will include a survey at the end of the school year. The survey will include open-ended questions based on the goals set forth during the PD. The survey will be anonymous and will serve as a basis for making adjustments to the process of the PD and as a basis for future research.

Leadership and Change

Change causes many emotions, and it is human nature to become comfortable with how things are done. However, it is necessary to stay current with best practice to do what is best for students. Leaders should encourage educators to implement formative assessment practices with fidelity because it is what is best for students.

Data analysis was discussed at each of the schools with the administration to support administrators in providing professional development for teachers. Making student assessment more of a practice and a process is a paradigm shift for districts.

Based on my research, written formative feedback is a tool for changing student achievement, improving instruction, and instigating tremendous social change.

Analysis of Self as Practitioner

The journey of writing a dissertation is one filled with many emotions. Walden University gave me an excellent experience in growing my intellect and becoming a scholarly writer. This was no easy process. I pursued my journey with professors who challenged me, who questioned my understanding of the topic, who made me want to succeed, and who gave me the feedback I needed to continue. Every time I sat in front of the computer and researched, I walked away wanting to know more. Pushing myself and believing that I could do this gave me the strength that I needed to get this far. I feel as though I am about to embark on a new life. I was attracted to Walden due to the school's emphasis on social change and flexibility in learning, being an educator and a servant to the community who strives to make a difference in the world. The tools that I have developed during my years of study at Walden University are tools that will support me in my endeavors to make a difference. Walden University has strengthened my skills as a scholar, increased my capacity for inspiring teachers to do what is best for students, and most of all, given me tools to transform the lives of other educators. This journey has given me strength and has allowed me to grow professionally as a scholar.

As an adjunct professor, I feel that I should be able to give adult learners high-quality feedback. The topic that I researched gave me understanding and the necessary tools to provide learners with quality feedback. As a supervisor for elementary instruction, I have been given the opportunity to guide elementary administrators in their understanding of formative assessment and feedback. This opportunity has allowed me to

contribute to changing teachers and students through the professional development that I have been able to lead. Feedback is part of communication, and communication is one of the hardest skills to acquire; however, it is one of the most important skills to develop to cause change.

Analysis of Self as Project Developer

As a project developer, I hope to collaborate with educators who have an in-depth understanding of formative feedback. I seek to continue to grow and to create a professional development guide that focuses on the formative assessment process. I am motivated by the goal of providing teachers with professional development that can be used immediately in the classroom and then fine-tuned as teachers develop their understanding of written formative feedback.

The Project's Potential Impact on Social Change

Throughout the study, I learned that teachers often have the best intentions for students. Public schools educate all students, and teachers have proven that they are learners and are always seeking ways to provide students with the best possible instruction that they can provide. Formative feedback practices are not in place at the level that they should be. For this reason, a focus on the formative feedback process and the idea of formative assessment being a process, not only being a one-time assessment, needs to be pursued to improve instruction and achievement for all students. The potential impact of this project involves having teachers understand that giving feedback to students that is descriptive in nature and aligns with learning outcomes will build student self-efficacy, and give students the steps they need in order to understand the specific goal or concept being taught.

Implications, Applications, and Directions for Future Research

Written formative feedback may increase student achievement. Therefore, a focus on professional development and time spent understanding how to give descriptive feedback is critical in knowing what steps are necessary to increase student learning. Research in other content areas, and at higher grade levels using FTC, may support PD on formative feedback at all grade levels and for all content areas. Working with others to research this topic on a grander scale would be rewarding as well as informative for educators. Future research may allow for a more in-depth look at written and oral feedback and may be used to determine which feedback supports students learning best. Students' mindsets may figure into this research, in that it may address whether mindset plays a role in how students perceive formative feedback. By investigating student mindset, researchers may begin to understand why some students use written feedback and some students do not. Considering mindset and types of feedback in future studies may bring educators closer to understanding how to improve student learning..

Conclusion

Formative feedback may increase student learning. Future professional development that is devoted to understanding formative feedback will have an impact on student achievement and on how educators reach all students. This process may allow teachers to focus on specific types of feedback that students need based on the learning objective. Overall, the experience of this research project was empowering and transformational for me as an educator. This research may be of interest to new teachers coming into the district. This opportunity may allow teachers to understand early in their careers what educators have taken decades to put into practice. In order to have a long-

lasting impact on student learning, teachers and administrators need to participate in professional discussions about written formative assessment to develop a deeper understanding and to consistently provide students with appropriate written feedback as part of instruction.

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Appendix A: Written Formative Feedback Project

Table of Contents

The Project

Professional Development Manual

Written Formative Feedback: Improving Student Learning and Doing What Is Best for Students in Mathematics

Sharon Shrum

Walden University

Professional Development: Training Curriculum and Materials

The PD is based on sustained duration, content focus, collective participation, active learning, and coherence (Desimone, 2009).

Purpose: The purpose of the PD is to provide an understanding of formative assessment with an emphasis on written formative feedback.

Sustained Duration

The intended audience for the Formative Feedback PD is geared towards K-5 elementary teachers who teach mathematics. Teachers will be provided a three-day in-depth training and follow-up sessions throughout a two-year cycle that will occur during the school day.

Content Focus:

The purpose of the PD is increase teachers' knowledge about the process of formative assessment and with an emphasis on descriptive feedback. A process for implementation of written formative assessment in the classroom will be provided. And, support for school-wide implementation and districts implementation of the process of written formative assessment at all grade levels and in all content may be gained from this process.

Collective Participation:

Suggested Participants: Administrators, teachers, and any stakeholders who are a part of the Professional Learning Teams

It is recommended that, prior to beginning professional development for formative feedback, school leaders consider using Alberta's Education Partners

(2010), a guide to support implementation: Essential conditions. Edmonton, AB: Retrieved from http://www.essentialconditions.ca/. As with all initiatives a plan for implementation should be created by stakeholders that may be involved in the implementation. Therefore it is suggested that the seven tenets for creating the conditions of a high quality professional development be considered prior to implementation. School will begin by creating a plan for implementation.

Active Learning and Coherence

These two areas are further explained in the implementation of the PD during the 3-day training and during the PLC collaborative meetings.

Materials

- Schools Implementation Plan
- Facilitator Slides
- Dylan Wiliams (2015) pages 126-127; Comment Only Grading (Butler, 1988)
- 5 Key Strategies to Formative Assessment by Dylan Wiliam (2012)
- Slides 7 and 9 are laminated handout
- Textbook Resources: Heritage, M. (2010). *Formative assessment: Making it happen in the classroom*. Thousand Oaks, CA: Corwin.

Timeline

There are three modules created for district, schools, or teacher leaders to provide three days of professional development. Each module will take one day. Follow-up sessions throughout the next 2 years will include teacher led collaboration times, video-taped formative feedback sessions, and submission of formative feedback results on student documentation. These areas will be further explained within each module.

Overview:

Module One: Will give leaders the foundational tools needed to understand what formative assessment is and what it is not. Each module consists of facilitator notes, slide presentation and activities. (Day 1)

Reference Handouts:
Dylan Wiliams (2015) pages 126-127; Comment Only Grading (Butler, 1988)
5 Key Strategies to Formative Assessment by Dylan Wiliam (2012)

Module Two: Will give a deep understanding of the types of formative feedback teachers can give and will guide educators through how to evaluate their own feedback and recognize different types of feedback. (Day 2)

Module Three: Will allow teams to design a plan for implementation in the classroom and how to evaluate the effect of formative feedback. (Day 3)

Module 1

Will give leaders the foundational tools needed to understand what formative assessment is and what it is not. Each module consists of facilitator notes, slides and activities. (Day 1)

See facilitator slides and notes embedded.

Goals and Learning Outcomes:

- Understand what formative assessment is and is not
- Understand that formative assessment is a process not a thing
- Understand the different types of formative feedback

To Do List:

- Familiarize yourself with facilitator slides
- Facilitators may want to bring their own student work for two students and summative grades on common unit assessments. (assessments will only be used in modules #2 and #3)
    - Have participants bring 10 graded work samples from one teacher (It is suggested that all samples come from the same student) or from their own classrooms (but for only one student) depending on the audience and being familiar with students' summative assessment score on common unit assessments
    - Supply paper at each table top and writing utensils
    - Have participants sort student work and determine the types of feedback that the student is receiving

    Day one is about understanding the types of formative feedback.

    Ending the Day:
    Have participants begin to add feedback comments on student work they are reviewing. Have them bring copies of their work to Day #2. PD should be

scheduled at least one month apart to ensure participants have enough time to apply their understanding.

Exit Ticket:
What are my next steps?
What are my take-aways from today?
What am I pondering?

Next Steps at Schools:

Based on the desirable feedback that students need to increase their understanding of a specific concept or topic, teachers will begin to modify their feedback based on Gipps et al., (2004) feedback typology. Teachers are expected to choose five students who are at the lowest performing rate in their classrooms. Teachers will discuss with each of the students that he/she will be writing on his/her classroom tests, quizzes, homework, and classroom assignments. Teachers will model and discuss with each of the students what they should do with the feedback. Teachers will create an I-chart when discussing with students the expectations. The I-chart, which represents students becoming independent, will remain in the classroom and made into a handout as a reminder for students. The I-chart will describe what students should do when teachers give feedback. The discussion with the students when creating the I-chart allows students to be a part of the decision-making process and understand the expectations. See below for a sample I-chart.

Written Feedback Expectations	
Teacher	Student

• Write feedback on student work that tells students what they should work on • Make suggestions on steps students should take to understand what was not clear • Check student changes and confer with students when changes are made	• Read feedback • Try to make suggested changes • Don't give up • Believe you can do it!

Teachers should model WHY this is important and add student's key words at the top in the heading to ensure students know why and how this process will benefit them.

To help me understand

Builds stamina and accuracy

These five students will be monitored throughout the year. A collection of student work samples will need to be collected and categorized by type of assignment. Teachers will meet each month to determine what types of feedback each teacher is giving. The first 2 months teachers will analyze and collaborate with their grade level teams on the types of feedback given and monitor the different types. The goal is to practice and understand how the teacher is giving the four types of feedback and which feedback falls under each of the categories. An electronic document will be used with each of the teachers to add specific feedback under each of the headings in FTC. Monthly descriptive feedback will then be given to the teachers that will improve their understanding of formative feedback.

Module 2

Module Two: Will give a deep understanding of the types of formative feedback teachers can give and will guide educators through how to evaluate their own feedback and recognize different types of feedback. (Day 2)

Goals and Learning Outcome:

- Analyze different types of feedback
- Determine what type of feedback you give

Notes:

- See embedded facilitator slides
- Have participants bring student work that has been graded by teachers

Day two is about understanding what types of feedback participants or teachers are giving and recognizing where to improve.

Exit Ticket:
What are my take-aways from today?
What are my next steps?

Next Steps at Schools:

The next 3 months teacher teams will gain feedback from their peers. Teacher teams will meet monthly and discuss how their feedback had changed or how they have modified their feedback. Teachers will provide a summary of students' perception of the feedback and their perception.

Module 3

Module Three: Will allow teams to design a plan for implementation in the classroom and how to evaluate the effect of formative feedback. (Day 3)

Goals and Learning Outcome:

- Create a plan to implement in your district, school or classroom

Notes:
See embedded notes in facilitator slides

Next Steps at Schools:

Teacher teams will create a plan to continue monitoring students and determine how they can monitor student achievement. Student perception of feedback must be included within the design of the plan. Common achievement scores, such as district level assessments, common formative assessments, and pre- and post-assessments may be used. The duration of this process is for the remainder of the school year.

Year 2:

Teacher review results of previous year and create a plan for implementation of written formative feedback.

Non-negotiables in Year 2:

1. Teachers should include oral conferences with students.
2. Videotaped conferences needs to be added to the plan.
3. Videotaped conferences will be discussed with group each month as well as student work samples with feedback.
4. Teacher teams should create a schedule to include all PLC members to have the opportunity to collaborate throughout the year.

Student Achievement Results:

At the end of the 2 years teachers will reflect on their perception, student perception, and student achievement results. Results will be compiled and distributed to specific district stakeholders. Next steps for the school district will be to update administrators, other teachers, board members, and central office on the outcome of the study and the proposed project. Select participating teachers will provide their data with state leaders and state and national conferences.

Professional Learning Teams in Year 1 & 2:

Teacher roles need to be established to ensure progress is made.

Roles: Task Keeper, Communicator, Reporter

Expectation: All members participate. All members come prepared to discuss teachers' feedback. All members are respectful. All members complete cooperative learning rubric after each meeting. Any changes needed to be made to protocol will occur at the next meeting.

Topics: Collaboration, Peer Reviews, and Group Evaluation.

Collaboration: When teachers begin with a collaborate design and discuss descriptive formative feedback, along with student achievement, there are direct gains in teacher understanding. Focusing on student assessments causes the teachers to be connected to the discussion and results (McTighe & Thomas 2003). The project expectations include team collaboration throughout the two-year process.

During collaborative team meetings a peer review process should take place. Specific protocols should be in place during the team meetings. The discussions will be

performed around Gipps et al. (2004) feedback typology. Specific roles will be assigned to the group members. Task keeper will distribute the typology, the communicator reviews the typology at the beginning of each collaborative planning meeting, and all other members give feedback on how the student is performing based on the teacher-given feedback. All members then reflect on the feedback compared to the typology on the reflection sheets.

Finally, the last component is group evaluation. Each group member shares for two minutes, while others take notes and compare against their reflection. Then the reporter asks each member for a summary of the suggestions from the participants and gives the documentation to the teacher who initially described his feedback. At the next meeting each teacher will indicate changes they made and begin the cycle of sharing the feedback given to students and a summary of student achievement.

Formative Feedback Self-Reflective

Cooperative Learning Teams Rubric

Category	**4**	**3**	**2**	**1**
My Contribution to Group Goals	Consistently participates and actively works toward group goals;	Works toward group goals without occasional prompting;	Works toward group goals with occasional prompting;	Works toward group goals only when prompted.
My Contribution of Knowledge	Consistently contributes knowledge, opinions, and skills professionally;	Contributes knowledge, opinions, and skills without prompting;	Contributes information to the group with occasional prompting;	Contributes information to the group only when prompted.
How I Consider Others:	Values the knowledge, opinion, and skills of all group members. Comes to meetings prepared;	Encourages the participation of others respectfully. Comes to meetings prepared;	Is open to reminders about respecting others. Comes to meetings prepared most of the time;	Needs reminders from others about respect; Does not come to meetings prepared.
Reflection:	**My participation was...** **I can improve by...** **Peer Feedback:**			

PLC Feedback Reflection Sheet:

Type of feedback given:
Reference Typology:
Suggestions to teacher:

Administrative/Teacher Survey: Pre/Post Reflection

Analysis of Current Feedback Practices

a) Estimate the percentage of your current feedback in each feedback typology

b) Determine your desired percentage of each feedback type.

c) Cite examples where you most often use feedback

d) Cite potential application for the changes.

Adapted from Killion (2015a)

Evaluative Feedback				Descriptive Feedback			
A1	A2	B1	B2	C1	C2	D1	D2
Rewarding (positive)	Punishing (negative)	Approving (positive)	Disapproving (negative)	Specifying attainment	Specifying improvement	Mutual construction of achievement	Mutual construction of improvement
a)							
b)							
c)							
d)							

Evaluation

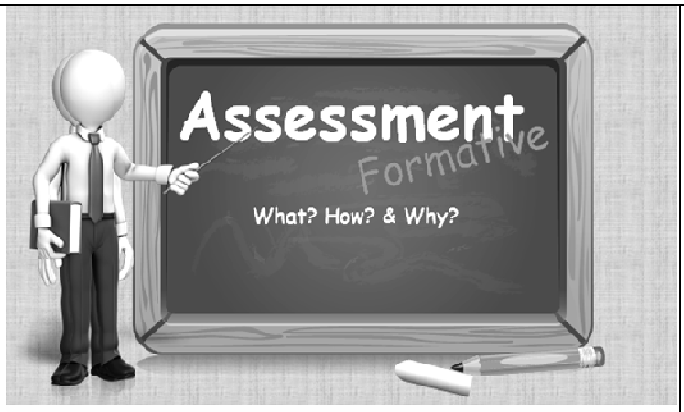
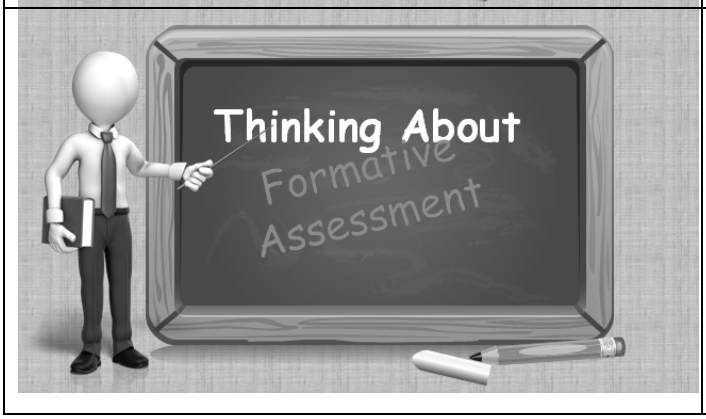
A summative evaluation is based on each module and should be used at the conclusion of each module. The evaluation was created to align to the professional development. A summary of the training will be gathered through an online survey. A summary of the evaluation will be summarized and given to the districts to support and sustain written formative assessment PD. All evaluations will be confidential and identifying information will not be disclosed.

Written Formative Feedback

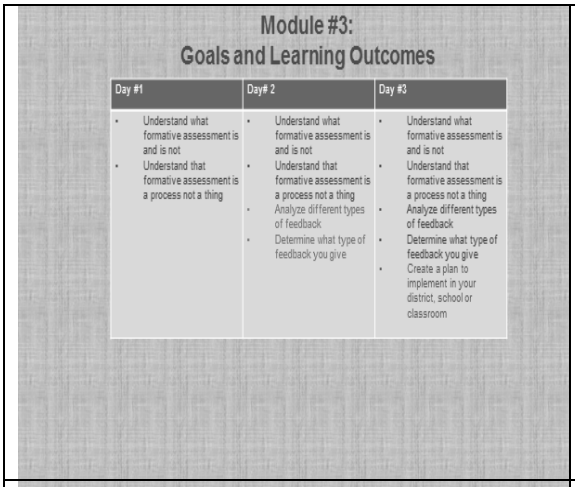
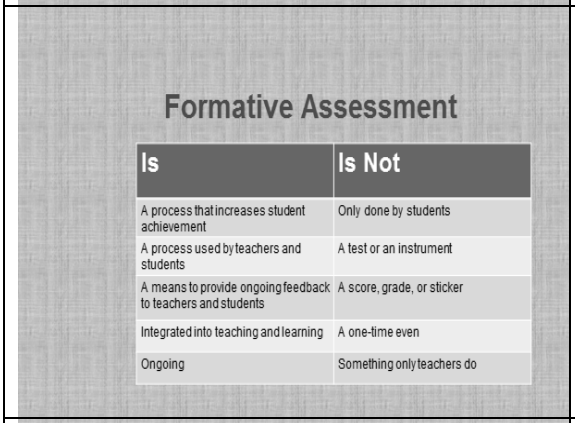
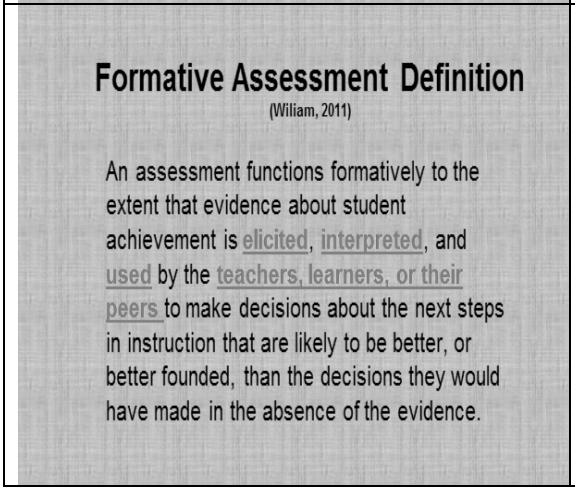
Program Implementation
Program Evaluation

Year 1 Module 1	Rate each item under each module.	**Disagree** **1**	**2**	**3**	**4**	**Agree** **5**
1	Materials met goals	1	2	3	4	5
2	Application met goals					
Comments						
Year 1 Module 2						
1	Materials met goals					
2	Application met goals					
Comments						
Year 1 Module 3						
1	Materials met goal					
2	Application met goals					
Comments						
Year 2	Reflect on Teacher Perception					
	Reflect of Student Achievement					
Overall Comments						

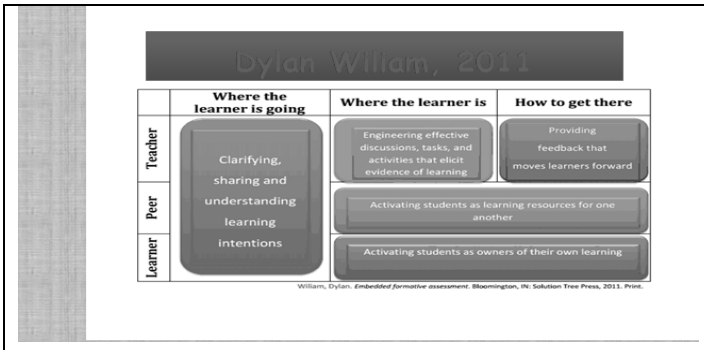
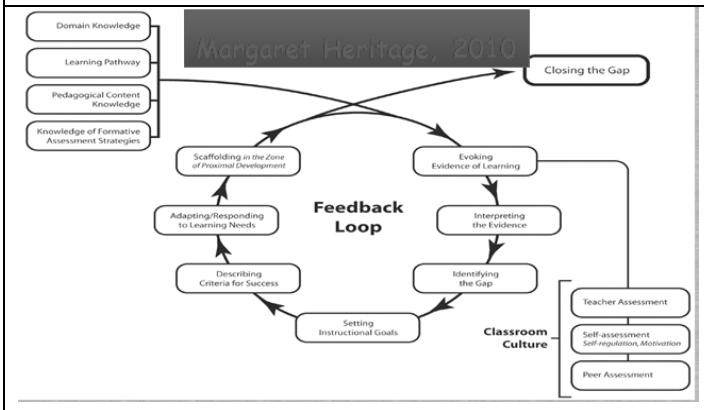
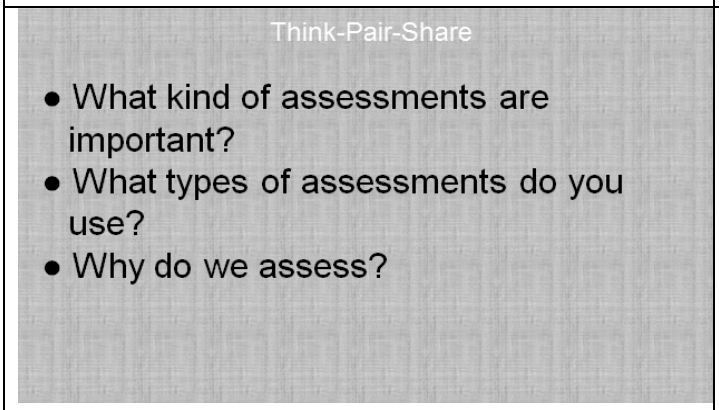
PD Slides

	Welcome and introduction of self.
	Discuss three-day process for professional development
	Have participants write down what they think formative assessment is. Write down on paper. Crumble paper and form a circle. Have participants throw their papers at one another. Discuss in partners what you agree with and what you disagree with. Facilitator listens and shares.

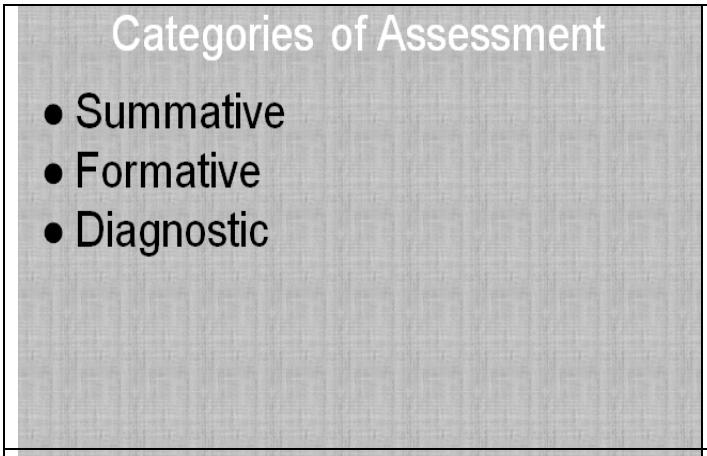
Slides 4-6

	Go over learning goals and briefly discuss what occurred on each of the days. Facilitator can have participants write on chart paper each session to remind them of where they are in their learning or presenter may want to share out.
	Reference Dylan Wiliam (2015); Margaret Heritage (2010)
	Read quote emphasizing underlined words and then compare to Margaret Heritage's work on the next slide. These two slides should be reproduced for participants as handouts.

Slides 7-9

	Discuss participants in feedback and discuss three questions. Have groups discuss and give thoughts about the graphic organizer. What do they notice?
	Discuss participants in feedback and discuss three questions. Have groups discuss and give thoughts about the graphic organizer. What do they notice?
	Think-Pair-Share Discussion

Slides 10-12

	Give definition of formative assessment. Summative be formative? Research. Can diagnostic be formative?
	Have participants define and share research
	Reference John Hattie's work 0.77 standard deviation for all students 1.25 ES for SpEd students 1.13 for feedback that provides cues and corrective feedback 0.81 on only cues 0.74 on cues, participation, reinforcement Share with participants the impact of feedback and Helen Temperley's Feedback section 8.16 in International Guide to Student Achievement, edited by John Hattie and Eric Anderman (2013)

Slides 13-15

Types of Feedback (Gipps et al. 2003) *Evaluative and Descriptive Feedback* Evaluative Feedback: A1 Rewarding (positive); A2 Punishing (negative); B1 Approving (positive); B2 Disapproving (negative) Descriptive Feedback: C1 Specifying attainment; C2 Specifying improvement; D1 Mutual construction of achievement; D2 Mutual construction of improvement Giving rewards; Giving punishment; Expressing approval; Expressing disapproval; Telling children they are right/wrong; describing why the answer is correct, telling children what they have or have not achieved; Specifying or implying a better way of doing something; [eg. Discussing with children the features of a piece of work]; Getting children to suggest ways they can improve *Note.* Adapted from Gipps et al. (2003).	Facilitator: Go over types and categories of feedback. Have teachers sort and discuss types. Provide examples first from list and practice whole group.
	Facilitator will ask participants to get graded assessments out that they have been asked to bring. At their table tops participants will begin sorting by category and writing on Post-its.
	REVIEW DAY #1

Slides 16-18

Module #2: Goals and Learning Outcomes • Understand what formative assessment is and is not • Understand that formative assessment is a process not a thing • Analyze different types of feedback • Determine what type of feedback you give	Module Two: Will give a deep understanding of the types of formative feedback teachers can give and will guide educators through how to evaluate their own feedback and recognize different types of feedback. (Day 2)
Module #3: Goals and Learning Outcomes Day #1: Understand what formative assessment is and is not; Understand that formative assessment is a process not a thing Day# 2: Understand what formative assessment is and is not; Understand that formative assessment is a process not a thing; Analyze different types of feedback; Determine what type of feedback you give Day #3	Go over learning goals and briefly discuss what occurred on each of the days. Facilitator can have participants write on chart paper each session to remind them of where they are in their learning or presenter may want to share out.
Feedback Examples	Share examples of feedback from the study

Slides 19-21

<table>
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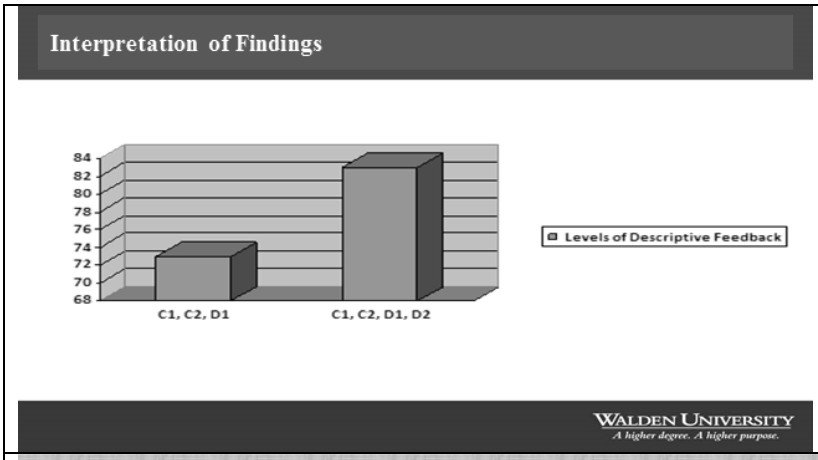
<td> 
</td>
<td>Interpretations and Findings:
Each of the research questions are in the upcoming slides.
Discuss the Findings, Relationship to the Literature, and Relationship to the Theoretical Framework.</td>
</tr>
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</td>
<td>Discuss Day #1 & #2 and then go to next slide reviewing outcomes of day 3</td>
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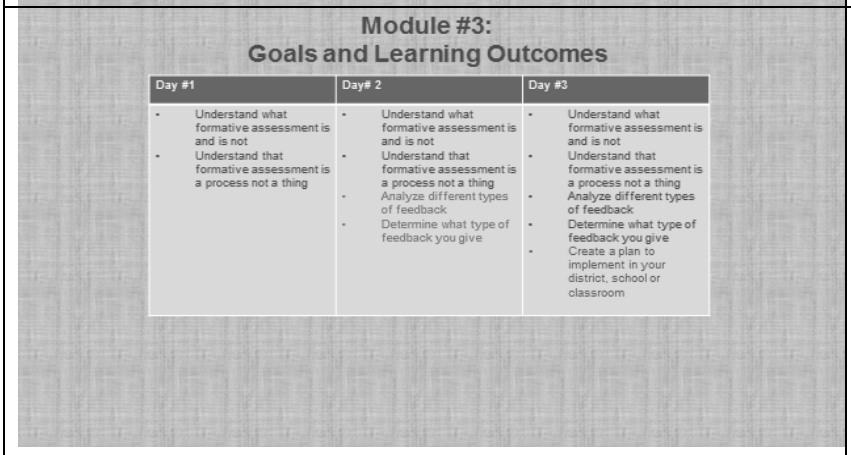
<td> 
</td>
<td>Go over learning goals and briefly discuss what occurred on each of the days.
Facilitator can have participants write on chart paper each session to remind them of where they are in their learning or facilitator may want to summarize.</td>
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Slides 22-24

Planning Process 1. Determine your audience. (Start small) 2. When will training take place? 3. How often will you meet? 4. What cost are involved? 5. When will teachers have follow-up discussions? 6. How will you keep track of student achievement and types of feedback?	Morning: Discuss questions and answer any questions. Create plans in Google. Use Google forms for creating a data dashboard with feedback types
	Afternoon: Discuss plans and make adjustments. Plans need to be in an electronic format to document progress. See document layout to collect data. Facilitators from each location will discuss how students are impacted from the feedback and teachers will modify feedback techniques as they move through the process.
Follow-Up • Share information from each of your schools with presenter. • Student names should be numbers only • Summarize your findings and next steps	Go over expectations

	Closure and discuss follow-up Questions?

Closure:
Follow-up with schools and give feedback through electronic documents.

- Get permission from participants to use in a larger study.
- Discuss with districts student and parent permission for use of data.

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Appendix B: Teacher Feedback Interview Protocol

RQ: How does formative feedback influence student achievement in elementary mathematics?

Procedure:

Definition of Feedback: *Feedback* is defined as effective when it consists of information about progress and next steps in the students learning process (Hattie & Timperley, 2007).

Evaluative: Involves a value judgment. [Rewarding, Punishing, Approving, Disapproving; see Typology]

Descriptive: Describes what the student said or did and provides guidance for improvement

(Gipps & Tunstall, 1996).). [Specifying attainment, Specifying improvement, Mutual construction of achievement, Mutual construction of improvement: see Typology]

1. What types of feedback do you give to students on **formative assessments**?

a.) What effects, if any are you seeing resulting from written feedback?

b.) Do you differentiate feedback for different students?

c.) How much and/or often (frequency) do you give this type of feedback?

d.) How do students respond to evaluative feedback?

e.) How do students respond to descriptive feedback?

f.) Do you give more evaluative or descriptive feedback in writing?

Prompt with examples if none are mentioned)

Evaluative: Involves a value judgment. [Rewarding, Punishing, Approving, Disapproving; see Typology]

Examples: Good Job!; Well Done!;Putting only grades on work that is intended to be formative or for practice; telling the student that the work is "good" or "bad" (Brookhart, 2009);

Descriptive: Describes what the student said or did and provides guidance for improvement (Gipps & Tunstall, 1996). [Specifying attainment, Specifying improvement, Mutual construction of achievement, Mutual construction of improvement]

Examples: You understand when to use multiplication and division; however, read page 40 in your math text and then look at question #4 again; In questions 4-6 go back to your definition and examples of percentages and then try these problems again; For example Brookhart (2008) refers to descriptive feedback or good feedback as identifying the students' strengths and weaknesses in their work and expressing what you observe in their work.

2. What types of feedback do you give on **daily assignments**?

a.) What effects, if any are you seeing resulting from written feedback?

b.) Do you differentiate feedback for different students?

c.) How much and/or often (frequency) do you give this type of feedback?

d.) How do students respond to evaluative feedback?

e.) How do students respond to descriptive feedback?

f.) Do you give more evaluative or descriptive feedback in writing?
(Prompt with examples if none are mentioned)

Evaluative: Involves a value judgment. [Rewarding, Punishing, Approving, Disapproving; see Typology]
Examples: Good Job!; Well Done!;Putting only grades on work that is intended to be formative or for practice; telling the student that the work is "good" or "bad" (Brookhart, 2009);

Descriptive: Describes what the student said or did and provides guidance for improvement (Gipps & Tunstall, 1996). [Specifying attainment, Specifying improvement, Mutual construction of achievement, Mutual construction of improvement]
Examples: You understand when to use multiplication and division; however, read page 40 in your math text and then look at question #4 again; In questions 4-6 go back to your definition and examples of percentages and then try these problems again; For example Brookhart (2008) refers to descriptive feedback or good feedback as identifying the students' strengths and weaknesses in their work and expressing what you observe in their work.

3. What types of feedback do you give on **homework**?

a.) What effects, if any are you seeing resulting from written feedback?

b.) Do you differentiate feedback for different students?

c.) How much and/or often (frequency) do you give this type of feedback?

d.) How do students respond to evaluative feedback?

e.) How do students respond to descriptive feedback?

f.) Do you give more evaluative or descriptive feedback in writing?

(Prompt with examples if none are mentioned)

Evaluative: Involves a value judgment. [Rewarding, Punishing, Approving, Disapproving; see Typology] *Examples: Good Job!; Well Done!;Putting only grades on work that is intended to be formative or for practice; telling the student that the work is "good" or "bad" (Brookhart, 2009);* *Descriptive:* Describes what the student said or did and provides guidance for improvement (Gipps & Tunstall, 1996). [Specifying attainment, Specifying improvement, Mutual construction of achievement, Mutual construction of improvement] *Examples: You understand when to use multiplication and division; however, read page 40 in your math text and then look at question #4 again; In questions 4-6 go back to your definition and examples of percentages and then try these problems again; For example Brookhart (2008) refers to descriptive feedback or good feedback as identifying the students' strengths and weaknesses in their work and expressing what you observe in their work.*
4. What other evidence might indicate ways the feedback influences students and their academic achievement?
5. Thinking about your perception of giving feedback and the impact on student achievement: a.) What have you learned from giving feedback to students? b.) What would you like to improve when giving written feedback? c.) What challenges have you had when giving written feedback?

Appendix C: Student Interview Feedback Protocol

Student Identification Number: _____ Assignment Number:_____

RQ: *How does formative feedback influence student achievement in elementary mathematics?*

Define feedback for the Student: When I talk about the word *feedback* I am referring to information you receive on tests or on assignments after your teacher returns it to you. Give students some examples that they may have noticed. Share student's original work to discuss their own feedback that was given.
Ask student:

1. Can you give me any examples of feedback that you have received on tests and daily assignments?
Prompt if student does not understand:
For example, feedback is when the teacher writes words or comments about what you can do to improve or comments on how well you did. The teacher could also write symbols on the tests, like a smiley face, checks, grades A-F, or percentages like 85%. Does that make sense?

2. I am going to read to you some words that teachers write on student's assignments, homework, and assessments. We are going to think about each of these one at a time. For instance, let's think about **classroom assignments**. I am going to read you some comments and you tell me if you receive any of these types of comments from your teacher, if so how are they alike or different from what you receive.

a.)Classroom Math Assignments:

Comments:	**Yes or No**	**If so, how are they similar? Different?**
The chart you drew shows you understood the problem and were able to explain it by using a diagram.(descriptive)		
The chart you drew did not have details like the ones I received from the rest of the class. (evaluative)		

b.)Math Homework:

Comments:	**Yes or No**	**If so, how are they similar? Different?**
I love how you are circling the problems that you struggled with and telling me where you didn't understand. (descriptive)		
Stickers are placed on the homework, no explanation. (evaluative)		

c.)Math Assessments:

Comments:	**Yes or No**	**If so, how are they similar? I**
Go back and look at numbers 3-6, check adding and subtracting. (descriptive)		
Your test was the best one in the class, you have a "free pass" for homework!		

3. I am going to read some comments to you and then give you some choices on how they would make you feel if you received this comment on a test, class assignment or homework. I would like you to choose the one that describes how you would feel. If I don't give you a choice that tells how you feel them let me know what your feelings would be.

Read and show comments on cards to students	Choices	Student's Comments/ Questions
a.) "Tell me how you can fix number 4" [mutual construction of improvement]	o Ignore the comment o Re-do the problem o Re-do the problem and write a comment to the teacher	
b.) "Your details in the line graph explains your thinking clearly" [mutual construction of achievement]	o Ignore the comment o Read the comment and do nothing o Read the comment and share with someone	
c.) "Try drawing out your thinking using a graph on problem 6-8 and see if that helps you get your answer"[specifying improvement]	o Ignore the comment o Re-do the problem another way other than the way your teacher suggested o Re-do the problem and share with your teacher	
d.) "Numbers 2-5 are incorrect. Redo paying close attention to the addition and subtraction symbol"[specifying attainment]	o Ignore the comment o Re-do the problem o Re-do and share with your teacher	
e.) "I know you can do better if you try harder" [disapproving negative]	o Ignore the comment o Re-do the problem o Re-do and share with your teacher	
f.) "I knew you could do it if you	o Ignore the comment	

tried" [approving positive]	o Re-do the problem o Re-do and share with your teacher		
g.) "You will need to do another practice page for homework" [punishing negative]	o Ignore the comment o Do the practice page on your own o Don't do the practice page o Ask for help from your teacher before doing the practice page o Ask for help from your parent before doing the practice page		
h.) "Good job - you get two stickers added to your sticker chart" [rewarding positive]	o Enjoy getting stickers to add to the class chart o Stickers make you try hard o Stickers don't matter		

4. I want you to pretend that each of the examples that I am going to read to you are comments that your teacher has written on a test, daily class work, or on your homework, and tell me whether you think each one would help you or would not help you and why or why not.

COMMENT	Yes or No	Why or Why Not?
a.) "Tell me how you can fix number 4" [mutual construction of improvement]		
b.) "Your details in the line graph explains your thinking clearly" [mutual construction of achievement]		
c.) " Try drawing out your thinking using a graph on problem 6-8 and see if that helps you get your answer"[specifying improvement]		
d.) "Numbers 2-5 are incorrect. Redo paying close attention to the addition and/or subtraction symbol"[specifying attainment]		
e.) "I know you can do better if you try harder" [disapproving negative]		
f.) "I knew you could do it if you tried" [approving positive]		
g.) "You will need to do another practice page for homework" [punishing negative]		

h.) "Good job -you get two stickers added to your sticker chart" [rewarding positive]			

5. (Student Perception) Share students' math assignments and assessments (tests) with the student:
You just took a test or this is one of your assignments that contain feedback.
a.) Explain what the comments on your paper mean to you and then answer the following question:
b.) Does the comment help you learn?
c.) If so how?
d.) What kind of feedback do you need that will help you learn?

Appendix D: Audio Recording of Student Interview Transcriptions Samples

Researcher: Can you give me any examples of feedback that you have received on tests and daily assignments?

Student: Some of the assignments or quizzes or test that I have done, um, she has written, um, good things on the assignments, and um, and advice on the ones that I haven't done or the ones that I don't have a score on and then she gives me some advice.

Researcher: Can you show me some of your work and the comments and tell me about what you did?
For example, feedback is when the teacher writes words or comments about what you can do to improve or comments on how well you did. The teacher could also write symbols on the tests, like a smiley face, checks, grades A-F, or percentages like 85%. Does that make sense?

Student: She wrote nice work on inverse operations. I love seeing the work. She said be precise.

Researcher: What did you do with these comments?

Student: I like that she did nice comments on the ones that she actually thought were good. When she gives advice, I try and use it on another assignment.

Researcher: Do you ever use the advice on this assignment?

Student: I don't think that we are allowed to change our work, but I use it on another assignment. Sometimes I go back on assignments but not on tests or quizzes.
I read them and then it depends on what I need to do. For example, my teacher would write, what did you forget or she would give me hints or strategies to try.

Researcher: I am going to read to you some words that teachers write on student's assignments, homework and assessments. We are going to think about each of these one at a time. For instance, let's think about **classroom assignments**. I am going to read you some comments and you tell me if you receive any of these types of comments from your teacher and if so, how are they alike or different from what you receive.

Researcher: Think about:
a.) Classroom Math Assignments
b.) Math Homework
c.) Math Assessments

Researcher: I am going to read some comments to you and then give you some choices on how they would make you feel if you received this comment on a test, class assignment, or homework. I would like you to choose the one that describes how you

would feel. If I don't give you a choice that tells how you feel, then let me know what your feelings would be. Test, class assignments, and homework.
Read and show comments on cards to students

Choices

Researcher: a.) "Tell me how you can fix number 4" [mutual construction of improvement]

Student: Re-do the problem.

Researcher: b.) "Your details in the line graph explains your thinking clearly" [mutual construction of achievement]
Student: Read the comment and share with someone.
It shows people that I am doing good on something and I would share the work.

Researcher: c.) "Try drawing out your thinking using a graph on problem 6-8 and see if that helps you get your answer"[specifying improvement]

Student: Re-do the problem and share with your teacher.
I would share with my teacher so she knows if her suggestion was working for me or not.

Researcher: d.) "Numbers 2-5 are incorrect. Redo paying close attention to the addition and subtraction symbol"[specifying attainment]

Student: Re-do the problem.
Just redo the problem.

Researcher: e.) "I know you can do better if you try harder" [disapproving negative]

Student: Re-do and share with your teacher.
Because she would probably like to know that I tried harder.

Researcher: f.) "I knew you could do it if you tried" [approving positive]

Student: Re-do and share with your teacher.
She would know that I tried and I took her advice.

Researcher: g.) "You will need to do another practice page for homework" [punishing negative]

Student: Ignore the comment.
Do the practice page on your own.
It would be wrong for me not to do it. But if I didn't have feedback...I would try and do it harder than I did last time and then I would ask my parents for help.

Researcher: h.) “Good job, you get two stickers added to your sticker chart” [rewarding positive]

Student: Stickers don’t matter.
Stickers don’t really matter. Not caring about how many stickers you get on the sticker chart, it’s that you made your teacher happy that you did well on the assignment.

Researcher: (Student Perception) Share students’ math assignments and assessments (tests) with the student:
Researcher: You just took a test or this is one of your assignments that contains feedback.

a.) Explain what the comments on your paper mean to you and then answer the following question:

b.) Do the comment help you learn?

Student: Yes.

Researcher:

c.) If so how?

Student: I read them and I like the nice comments. With the advice, I try and do that and use the advice.

Researcher d.) What kind of feedback do you need that will help you learn?

Student: I like written feedback and I like talking to her about it as well. First I read it and try and then I talk with her about it.

Appendix E: Student Work Samples

Written Feedback Rubric for [redacted]

1	2	3	4
I do not understand the feedback that my teacher has given. I have no plans for my next steps in learning.	I have some understanding of the feedback that my teacher has given. I am not exactly sure what my next steps in learning are.	I understand the feedback that my teacher has given. I know where to begin in planning my next steps in learning.	I completely understand the feedback that my teacher has given. I have a solid plan for my next steps in learning.

My next steps:

To hilite

3. Noah had 7 binders...

F. 14, 9 H. 11, 6
G. 16, 19 J. 13, 9

highlight to focus on task

5. Which situation can **NOT** be represented by 26 – n =17? ____

would using a highlighter have helped on t... prob...

A. 26 people got on an empty bus. At the first stop, some people got off the bus, leaving only 17 people on the bus.

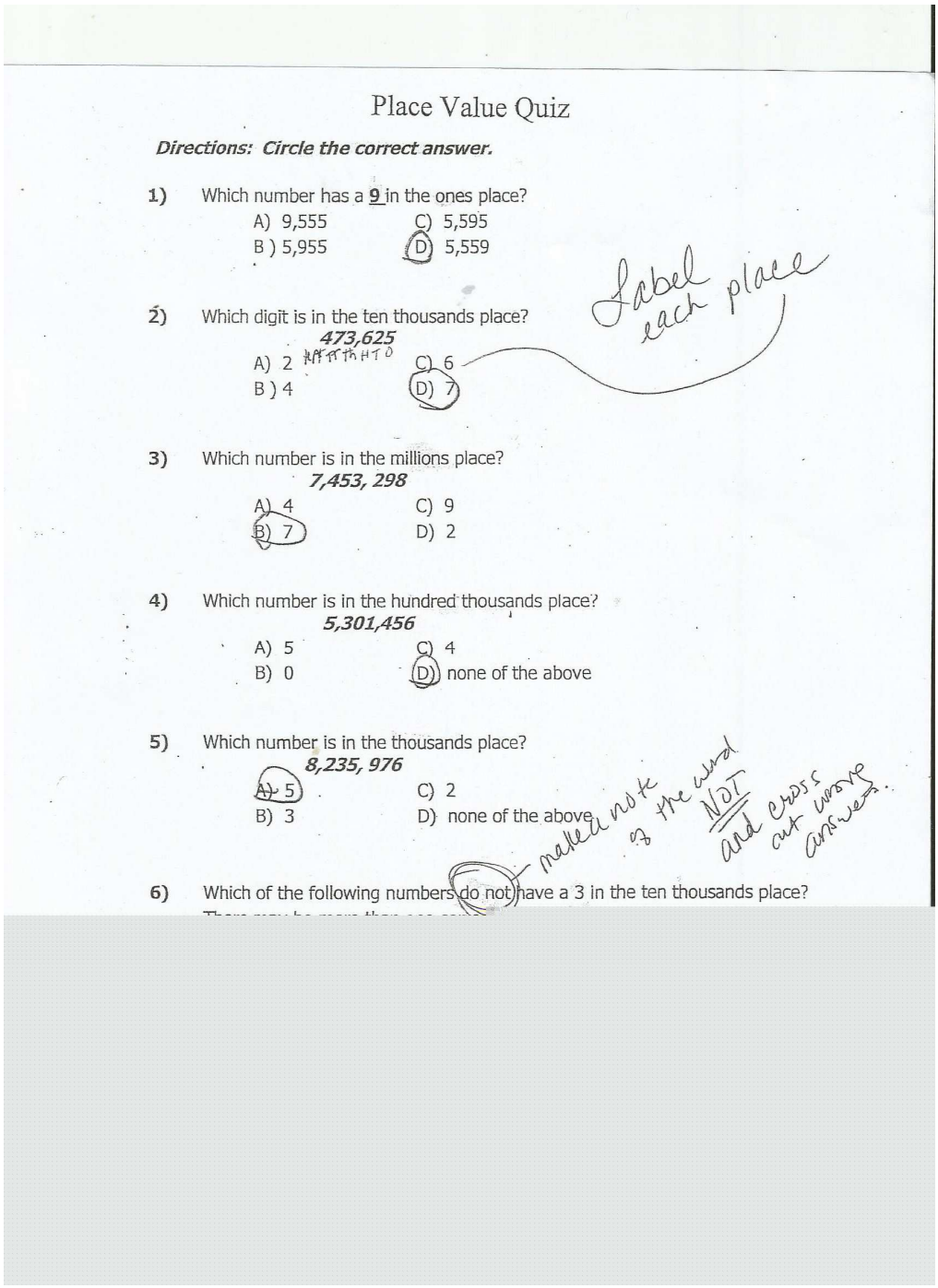
B. Wesley had 26 baseball cards. He gave some to Robin. Now Wesley has 17 baseball cards.

C. 26 people were in the waiting room. 17 more people entered the room.

D. Caleb collected 26 sea shells while at the beach. He gave some to a friend and has 17 left.

-1

Appendix F: Cursive Feedback



Place Value Quiz

Directions: Circle the correct answer.

1) Which number has a **9** in the ones place?

A) 9,555 C) 5,595
B) 5,955 D) 5,559

2) Which digit is in the ten thousands place?

473,625

A) 2 C) 6
B) 4 D) 7

Label each place

3) Which number is in the millions place?

7,453, 298

A) 4 C) 9
B) 7 D) 2

4) Which number is in the hundred thousands place?

5,301,456

A) 5 C) 4
B) 0 D) none of the above

5) Which number is in the thousands place?

8,235, 976

A) 5 C) 2
B) 3 D) none of the above

make it not a the word NOT and cross out wrong answers.

6) Which of the following numbers do not have a 3 in the ten thousands place?

Appendix G: Audio Recording of Teacher Interview Transcriptions Samples

RQ: How does formative feedback influence student in elementary mathematics?
Procedure:
Share Definition of Feedback: *Feedback* is defined as effective when it consists of information about progress and next steps in the student's learning process (Hattie & Timperley, 2007).
Evaluative: Involves a value judgment. [Rewarding, Punishing, Approving, Disapproving; see Typology]
Descriptive: Describes what the student said or did and provides guidance for improvement (Gipps & Tunstall, 1996).). [Specifying attainment, Specifying improvement, Mutual construction of achievement, Mutual construction of improvement: see Typology].

1. What types of feedback do you give to students on **formative assessments**? My feedback to students has been both evaluative and descriptive. In recent years, I have moved from evaluative to much more descriptive feedback due to best practices using formative assessment. My feedback comes in both verbal and written form.

a.) What effects, if any, are you seeing resulting from written feedback? Students are able to understand why they missed the problem instead of just seeing that they missed the problem. It provides needed information to the student, so that they can reflect on their work and determine their next steps.

b.) Do you differentiate feedback for different students? Yes, I do differentiate my feedback for different students. I have to make sure that what I say to each learner is something that they can follow/understand. Some students are more sensitive as well, and I have to make sure that my feedback is building them up in addition to having them reflect on the specifics of their work

c.) How much and/or how often (frequency) do you give this type of feedback? I am giving my students feedback on a daily basis. I would have to say that I am still at the point where more of my feedback is verbal, but my use of written feedback is on the rise!

d.) How do students respond to evaluative feedback? It can build them up when it is positive. It can make them feel bad if it goes negative. It puts the focus on them and not necessarily the learning that is taking place.

e.) How do students respond to descriptive feedback? It makes them focus on where they need to go next in their learning. It's less personal and more about the learning!

f.) Do you give more evaluative or descriptive feedback in writing? Honestly, I still give both, especially when it is a positive evaluative comment. I also like to make comments that show that I am connecting to what they write. I mostly give, however,

descriptive feedback, because I want my students to focus on their learning and determine what they are going to concentrate on in their next paper.
Prompt with examples if none are mentioned)
Evaluative: Involves a value judgment. [Rewarding, Punishing, Approving, Disapproving; see Typology]
Examples: Good Job!; Well Done!;Putting only grades on work that is intended to be formative or for practice; telling the student that the work is "good" or "bad" (Brookhart, 2009);

Descriptive: Describes what the student said or did and provides guidance for improvement (Gipps & Tunstall, 1996). [Specifying attainment, Specifying improvement, Mutual construction of achievement, Mutual construction of improvement]
Examples: You understand when to use multiplication and division; however, read page 40 in your math text and then look at question #4 again; In questions 4-6 go back to your definition and examples of percentages and then try these problems again; For example Brookhart (2008) refers to descriptive feedback or good feedback as identifying the student's strengths and weaknesses in their work and expressing what you observe in their work.

2. What types of feedback do you give on **daily assignments**? If the assignment is going well, I more than likely put a percentage and quick positive comment. If the assignment is not going well, I more than likely put the percentage and a descriptive comment to help the student see/understand where he/she is in the assignment and how to move forward.

a.) What effects, if any are you seeing resulting from written feedback? The children seem to like it and are responding well to it! :) They are able to see the direction that they now need to move in in their learning.

b.) Do you differentiate feedback for different students? Yes.

c.) How much and/or how often (frequency) do you give this type of feedback? Pretty much daily...sometimes every other day.

d.) How do students respond to evaluative feedback? Positive when it is positive. Negative when it is negative.

e.) How do students respond to descriptive feedback? They reflect on their work and focus on how to make needed improvements by setting goals for themselves.

f.) Do you give more evaluative or descriptive feedback in writing? Descriptive

(Prompt with examples if none are mentioned)

Evaluative: Involves a value judgment. [Rewarding, Punishing, Approving, Disapproving; see Typology]
Examples: Good Job!; Well Done!;Putting only grades on work that is intended to be formative or for practice; telling the student that the work is "good" or "bad" (Brookhart, 2009);

Descriptive: Describes what the student said or did and provides guidance for improvement (Gipps & Tunstall, 1996). [Specifying attainment, Specifying improvement, Mutual construction of achievement, Mutual construction of improvement]
Examples: You understand when to use multiplication and division; however, read page 40 in your math text and then look at question #4 again; In questions 4-6 go back to your definition and examples of percentages and then try these problems again; For example Brookhart (2008) refers to descriptive feedback or good feedback as identifying the students' strengths and weaknesses in their work and expressing what you observe in their work.

3. What types of feedback do you give on **homework**? Verbal and descriptive

a.) What effects, if any are you seeing resulting from written feedback? I don't collect homework. I always go over it in class. My feedback is verbal.

b.) Do you differentiate feedback for different students? Yes

c.) How much and/or how often (frequency) do you give this type of feedback? On a daily basis.

d.) How do students respond to evaluative feedback? Positive when it is positive. Negative when it is negative.

e.) How do students respond to descriptive feedback? Positive...they see next steps and focus on the learning.

f.) Do you give more evaluative or descriptive feedback in writing? Descriptive

(Prompt with examples if none are mentioned)
Evaluative: Involves a value judgment. [Rewarding, Punishing, Approving, Disapproving; see Typology]
Examples: Good Job!; Well Done!;Putting only grades on work that is intended to be formative or for practice; telling the student that the work is "good" or "bad" (Brookhart, 2009);

Descriptive: Describes what the student said or did and provides guidance for improvement (Gipps & Tunstall, 1996). [Specifying attainment, Specifying improvement, Mutual construction of achievement, Mutual construction of improvement]
Examples: You understand when to use multiplication and division; however, read page

40 in your math text and then look at question #4 again; In questions 4-6 go back to your definition and examples of percentages and then try these problems again; For example Brookhart (2008) refers to descriptive feedback or good feedback as identifying the students' strengths and weaknesses in their work and expressing what you observe in their work.
4. What other evidence might indicate the ways the feedback influence students and their academic achievement? Other evidence includes data taken from improvement in exit tickets, graded practices, quizzes, and tests. I also see a difference in the attitude of the student. Willingness on their part to focus on their learning and focus on where they are going next. Children establishing learning goals are a beautiful thing!
5. Thinking about your perception of giving feedback and the impact on student achievement: a.) What is it that you have learned from giving feedback to students? That it guides and helps my students to become better learners! b.) What would you like to improve when giving written feedback? I would like to increase how often I do it, especially for higher leveled learners and really for all of my students. c.) What challenges have you had when giving written feedback? It takes time to write comments that help students reflect on their work.