

Gardner-Webb University

Digital Commons @ Gardner-Webb University

Doctor of Education Dissertations

School of Education

Summer 2020

Mastery Learning: A Mixed-Methods Study of Teacher Efforts Implementing Key Components of the Mastery Learning Framework

LaShay Conley

Gardner-Webb University, jmace@gardner-webb.edu

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



Part of the [Curriculum and Instruction Commons](#), and the [Educational Assessment, Evaluation, and Research Commons](#)

Recommended Citation

Conley, LaShay, "Mastery Learning: A Mixed-Methods Study of Teacher Efforts Implementing Key Components of the Mastery Learning Framework" (2020). *Doctor of Education Dissertations*. 11. <https://digitalcommons.gardner-webb.edu/education-dissertations/11>

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

MASTERY LEARNING: A MIXED-METHODS STUDY OF TEACHER EFFORTS
IMPLEMENTING KEY COMPONENTS OF THE MASTERY LEARNING
FRAMEWORK

By
LaShay Conley

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

Gardner-Webb University
2020

Approval Page

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

Sydney K. Brown, PhD
Committee Chair

Date

Jennifer Putnam, EdD
Committee Member

Date

Elizabeth Curry, EdD
Committee Member

Date

Prince Bull, PhD
Dean of the School of Education

Date

Acknowledgements

I would like to thank Dr. Sydney Brown for the guidance, support, and insight she has given me along every step of this process. This dissertation would not have been possible without her strong advice and continued analysis. To have her as the chair of my committee, I consider myself very fortunate and appreciative for her time and energy into the furthering of my education.

I would also like to thank my wonderful committee members. I would like to thank Dr. Jennifer Putnam for her helpful insight and suggestions. In addition to Dr. Putnam, I would like to thank Dr. Elizabeth Curry for stepping in when I really needed her on my committee.

In addition, I am indebted to Emily Robertson DeFreitas, Ginger Black, Shamona Fernanders, and Katrissa Fisher who have been alongside me in this journey.

This dissertation could not have been written without the Pink Elementary teachers and administration. I would like to thank them for their willingness and time in participation of this study.

I fondly thank my parents, Kip and Lisa Mace, for their unconditional love and support throughout this process. I also thank my in-laws, Scott and Tabatha Conley, for their encouragement during this endeavor.

I thank my precious son, Colten, for allowing me to have time to write that was uninterrupted, even when he did not understand why. My hope is that he will chase his dreams one day, just as his mother has.

Finally, I thank my amazing husband, Hunter. His love, patience, and support gave me the necessary time and confidence needed to complete such an intimidating task.

Abstract

MASTERY LEARNING: A MIXED-METHODS STUDY OF TEACHER EFFORTS IMPLEMENTING KEY COMPONENTS OF THE MASTERY LEARNING FRAMEWORK. Conley, LaShay, 2020: Dissertation, Gardner-Webb University.

This study works to assess the degree to which the impact of implementation of Mastery Learning can be described through teacher perception, academic achievement, and student growth. Elementary school teachers in a suburb in North Carolina implemented the Mastery Learning framework. The school's end-of-grade test scores were above state and district averages but did not meet expected academic growth as identified by the state. These results are an indicator that many of the students were proficient but were not growing at an acceptable rate. Beginning in the 2017 school year, teachers attended professional development training on the framework, processes, and best uses of Mastery Learning in a classroom. I created a survey, piloted a focus group, examined responses, and analyzed achievement data to determine the impact of the implementation of Mastery Learning at this site. The impact of Mastery Learning on student achievement and growth were examined, and teacher perceptions were studied. The results from this study led to conclusions that a need exists for students to master necessary skills, either before learning takes place or as a corrective teaching when a deficit is presented in learning, in order to show growth in student achievement scores. My recommendations were for the school to continue to pursue professional learning on Mastery Learning practices. I also recommend continuation of research on many of the Mastery Learning framework aspects in order to maintain high fidelity standards, increase participation from the teachers, and provide students more time to meet growth on achievement tests.

Keywords: mastery learning, benefits and challenges of implementation, academic achievement, teacher perception

Table of Contents

	Page
Chapter 1: Introduction	1
Mastery Learning Framework	3
Learning for Mastery Versus Personalized System of Instruction	5
Purpose of the Study	8
Research Questions	11
Researchers Role	12
Summary	13
Chapter 2: Literature Review	15
History and Design	15
Specifying What Is to Be Learned and How It Will Be Evaluated	19
Students Learning at Their Own Pace	21
Assessing Student Progress	23
Providing Feedback	27
Providing Remediation	29
Testing Final Learning Criteria Has Been Achieved	33
Effectiveness	36
Implementation Fidelity	38
Summary	39
Chapter 3: Methodology	41
Participants	43
Description of Work Setting	44
Research Questions	49
Research Design	50
Instruments, Procedures, and Data Collection	51
Qualitative Data Analysis	57
Quantitative Data Analysis	61
Delimitations	62
Limitations	62
Summary	63
Chapter 4: Results	65
Background	65
Explanation of the Study	67
History and Design	68
Specifying What Is to Be Learned and How It Will Be Evaluated	70
Students Learning at Their Own Pace	72
Assessing Student Progress and Providing Feedback and Remediation	74
Testing Final Learning Criteria Has Been Achieved	81
Implementation Fidelity	83
Effectiveness	83
Summary	87
Chapter 5: Discussion	90
Introduction	90
Summary of the Study	92
Interpretation and Discussion of Results	92

Limitations	113
Summary of Findings.....	113
References.....	115
Appendices	
A Survey Items.....	128
B Focus Group Questions.....	130
C Focus Group Protocol.....	132
Tables	
1 2016-2017 NC School Report Card EOG Score Comparison for Common Core State Standards Assessed.....	9
2 Academic Growth Scale for NC Schools.....	9
3 Academic Growth History	10
4 Years of Teaching Experience.....	46
5 Teachers with Advanced Degrees or National Board Certification	47
6 Average Class Size	48
7 Research Questions and Methods to Data Collection and Analysis.....	53
8 Past Mastery Learning Practices: Number of Coded Responses Per Theme.....	69
9 Specifying Learning and Evaluation Percent of Responses.....	70
10 Specifying Learning and How It Will Be Evaluated: Number of Coded Responses Per Theme	71
11 Students Learn at Their Own Pace Percent of Responses.....	73
12 Student Progress Assessed – Feedback and Remediation Are Provided Percent of Responses	75
13 Small Groups are Utilized.....	75
14 Data from Mastery Learning Are Utilized.....	76
15 Feedback Provided.....	77
16 Assessing Student Progress and Remediating Students.....	77
17 Prior Weekly Small Group Usage	78
18 Methods of Feedback Provided: Number of Coded Responses Per Theme	80
19 Testing Final Learning Criteria: Number of Coded Responses Per Theme.....	81
20 Use of EOGs to Determine Final Learning Criteria Percent of Responses	82
21 EOGs as a Final Learning Criteria: Number of Coded Responses Per Theme.....	82
22 NC School Report Card for EOG Proficiency Comparison.....	84
23 Academic Growth History 2015-2019.....	86
24 Research Questions, Findings, and Recommendations	91
25 NC School Report Card for EOG Proficiency Comparison.....	110
Figures	
1 Uniform Instruction	6
2 Optimal Instruction.....	7

Chapter 1: Introduction

Each year, educators are overwhelmed with demands to implement new educational practices and instructional interventions that all promise to improve student learning. It can be difficult for school leaders to meet these challenges. Guskey (2010) echoed this statement, “The pressure of a need to make improvements forces schools to move on with implementation in hopes that results will be positive for their teachers and students with regards to achievement” (p. 52). Luckily, many methods include pieces of strategies combined to produce positive results. One framework that encompasses multiple research-supported strategies with a record of accomplishment of relevance over decades is the framework of Mastery Learning (Guskey, 2010).

Slavin (1987) defined Mastery Learning as a method of instruction where the focus is on the role of feedback in learning; Mastery Learning refers to a category of instructional methods that establish a level of performance all students must master before moving on to the next unit. Astin (1993) and Martinez and Martinez (1999) stated during student work time, positive group experiences have been shown to contribute to student learning, retention, and overall college success. According to Bloom (1981), the teacher’s role is to maximize interaction with the students who are in need of the most assistance. In some classrooms, the teacher focuses on the group that struggles the most academically, in order to establish beginning foundational skills students must master before they move on to the next skill. In contrast, in other classrooms, teachers focus on students who have established foundational skills and are approaching mastery of standards. Guskey (2015) added that over the last 4 decades, few programs have been implemented as broadly or evaluated as thoroughly as those associated with Mastery

Learning. Further, programs based on Mastery Learning principles continue to operate today in nations throughout the world and at every level of education. Students in Mastery Learning classes, compared to traditionally taught classes, consistently have shown ability to learn better, reach higher levels of achievement, and develop greater confidence in their ability to learn and in themselves as learners. This study contributes to this body of research with an evaluation of end-of-grade (EOG) achievement scores, as well as EOG growth scores after implementation of Mastery Learning.

Changeiywo et al. (2010) reported that the goal of Mastery Learning is success for the student, in both achievement and motivation. In Mastery Learning, the subject matter is divided into units that have predetermined objectives or unit expectations. Students who are working independently or in a group are working through each unit in an organized fashion with the help of the teacher who is providing feedback to the students as they work and learn. Students must demonstrate mastery on unit exams before moving to new material. Students who do not achieve mastery receive remediation through tutoring, peer monitoring, small group discussion, or additional homework. The cycle of studying, testing, feedback, and remediation continues until mastery is met. In conjunction with going beyond basic facts on short answer or multiple choice exams, a lack of feedback for students has the possibility of being a related reason in which students have low reading performances. In order to increase achievement in all subjects, specifically reading, Edmunds and Bauserman (2006) suggested that teachers should relentlessly seek ways to enhance academic motivation for students through multiple opportunities to demonstrate successful learning.

Mastery Learning Framework

Block (1971) defined the key elements in the Mastery Learning framework: (a) clearly specifying what is to be learned and how it will be evaluated, (b) allowing students to learn at their own pace, (c) assessing student progress and providing appropriate feedback or remediation, and (d) testing that final learning criteria has been achieved. Guskey (2010) explained Mastery Learning stemmed from the work of Bloom (1971, 1978, 1981) who considered how teachers might adapt the most powerful aspects of tutoring and individualized instruction to improve student learning in general education classrooms (Guskey, 2010). Bloom (1971) suggested that although students may vary widely in their individual rate of learning, if teachers had the ability to provide time and learning conditions necessary, nearly all students would have the chance to reach a high level of achievement. Bloom (1976) added that traditionally, teachers teach a curriculum unit and then check on student progress at the end of the unit. He stated that these checks on student progress of learning would be much more useful if they were used as part of the teaching and learning process simultaneously to provide feedback on individual student's learning and their own difficulties and then to recommend remediation or intervention activities. Bloom (1971) named this strategy, which used feedback and corrective procedures, Mastery Learning (Guskey, 2010).

When teachers use the Mastery Learning strategy, they organize important concepts and skills they want students to learn or develop into units that take approximately 1 or 2 weeks of instructional time. Following that time of initial instruction, teachers provide a formative assessment that identifies what students have learned well and where they still need additional work (Bloom, 1971). The assessment

has specific, targeted suggestions about what students must do to correct their learning difficulties and to master the desired learning outcomes. Once students complete their intervention activities, they take a second “parallel formative assessment” that focuses on the same learning goals as the unit of study but includes different problems than the original assessment. This second assessment also has the power to motivate students through a second chance at succeeding (Guskey, 2010).

In addition to intervention activities that correct skills and standards students need to work on, Bloom (1971) recommended that teachers plan enrichment activities for students who demonstrate mastery on the first formative assessment. These enrichment activities have the ability to give these students the chance to broaden and expand their learning (Guskey, 2010).

Research on this instructional set of practices spans over decades. Bloom (1976) and Guskey (1987) believed that nearly all students, when provided with more favorable learning conditions of Mastery Learning, could truly master academic content. Kampen (2019) also explained that Mastery Learning ensures students obtain mastery in a given topic before moving on to the next unit. It assumes any student can reach high levels of achievement given sufficient instruction, time, and perseverance.

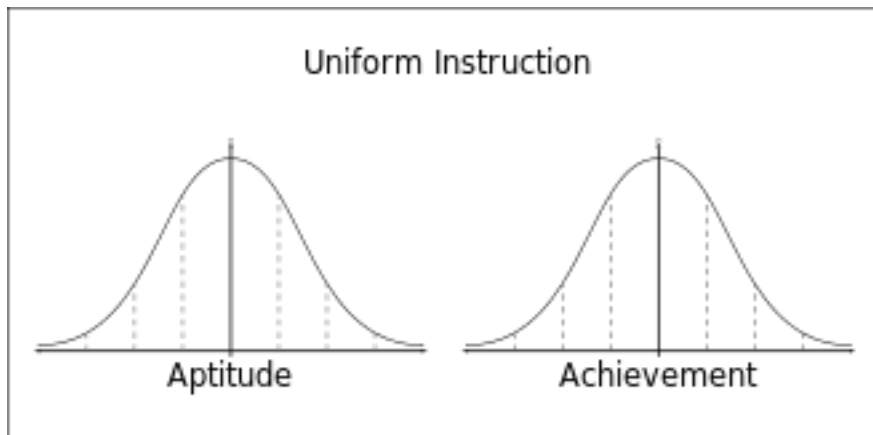
A vast amount of research over decades has shown that when compared to students in traditionally taught classes, students in well-implemented Mastery Learning classes consistently reach higher levels of achievement and develop greater confidence in their own ability to learn and in themselves as learners (Anderson, 1994; Guskey & Pigott, 1988; Kulik et al., 1990). Kampen (2019) found the average student taught in a Mastery Learning classroom achieves the same level as the top 15% of students in a

classroom not using the Mastery Learning framework.

Learning for Mastery Versus Personalized System of Instruction

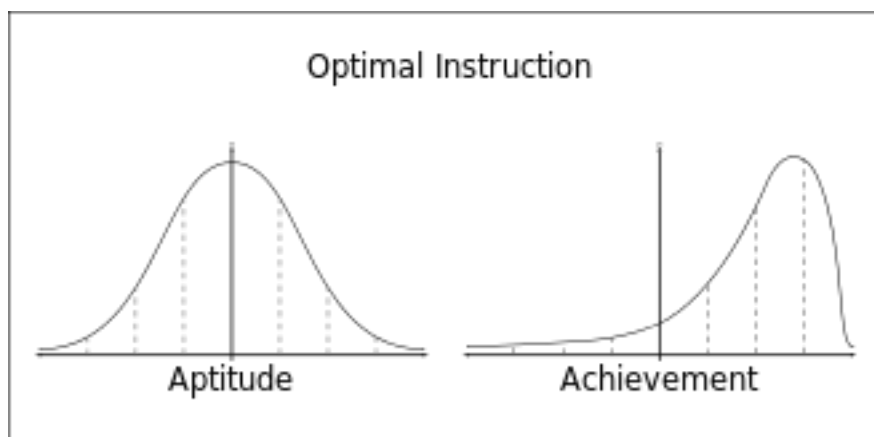
Bloom's (1968a) Mastery Learning and Keller's (1967) Personalized System of Instruction best represent Mastery Learning strategies. Bloom's (1968a) approach focused on K-12 classrooms, whereas Keller developed his system for higher education. Both have been applied in many different contexts and have been found to be powerful methods for increasing student performance in a wide range of activities (Bloom, 1968a). Despite sharing some commonalities in terms of goals, they are built on different psychological principles. Keller's theory focused on the ideas of reinforcement as seen in operant conditioning theories. Bloom (1971) theorized that if aptitudes were predictive of the rate at which a student can learn and not necessarily the level to which the student can learn, it should be possible to fix the degree of learning expected to some mastery level such that all or almost all students attain that level.

Mastery Learning is a program from Bloom (1971) that is widely used in school classrooms across the United States as well as in other countries. According to Bloom (1981), the motivation for the use of Mastery Learning comes from trying to reduce achievement gaps for students in average school classrooms. Carroll (1963) and Bloom (1968b) pointed out that if students are normally distributed with respect to aptitude for a subject and if they are provided uniform instruction (in terms of quality and learning time), achievement level at completion of the subject is expected to be normally distributed.

Figure 1*Uniform Instruction*

Note. Uniform instruction with respect to aptitude for a subject provided uniform instruction (in terms of quality and learning time), and achievement level at completion of the subject is also expected to be normally distributed.

The Mastery Learning approach proposes that if each learner were to receive optimal quality of instruction and as much learning time as they require, a majority of students could be expected to attain mastery (Bloom, 1968a). In many situations, educators preemptively use the normal curve for grading students where scores are set on a curve according to the frequency of distribution. Bloom (1968a) was critical of this usage, condemning it because it creates expectations by the teachers that some students will naturally be successful, while others will not. Bloom (1968a) defended the idea that if educators are effective, the distribution of achievement could and should be very different from the normal curve. Bloom (1968a) proposed Mastery Learning as a way to address this concept. He believed that by using his approach, the majority of students (more than 90%) would achieve successful and rewarding learning (Bloom, 1968a). Figure 2 represents this optimal instruction.

Figure 2*Optimal Instruction*

Note. Optimal instruction with Mastery Learning where each individual receives optimal quality of instruction, a majority of students could be expected to attain mastery.

As an added advantage, Mastery Learning was also thought to create more positive interest and attitude towards the subject learned if compared with usual classroom methods (Block, 1971). In a Mastery Learning environment, the teacher directs a variety of group-based instructional techniques with frequent and specific feedback by using diagnostic, formative tests as well as regularly correcting mistakes students make along their learning path. Assessment in the Mastery Learning classroom is not used as a measure of accountability but rather as a source of evidence to guide future instruction. A teacher using the Mastery Learning approach will use the evidence generated from their assessment to modify activities to best serve each student. Teachers evaluate students with criteria-referenced tests rather than norm-referenced tests. Huitt (1996) stated that in order to determine whether each student has achieved specific skills or concepts and to find out how much students know before instruction begins and after it has finished, teachers should use criteria-referenced tests. Huitt also defined norm-referenced tests as

ones given in order to rank students with respect to the achievement of others in broad areas of knowledge and to discriminate between high and low achievers. With this idea in mind, students are not competing against each other but rather competing against themselves in order to achieve a personal best.

There are contradictory findings when looking at studies of Mastery Learning. One reason may be the fidelity of implementation of the program. Within different schools and individual teacher classrooms, the practice of Mastery Learning varies. Teachers may offer large rewards such as class parties for 80% overall mastery; but in other settings, teachers may use the percent of mastery as a reading or mathematics grade. Furthermore, some commonly used pedagogical practices intended to enhance student engagement, such as the use of sanctions and rewards, actually undermine student motivation to learn (Meece & McColskey, 1997; Sheldon & Biddle, 1998).

Purpose of the Study

According to conversations between me, teachers, and administration of Pink Elementary School (a pseudonym), in the fall of 2017, a concern arose related to students in third, fourth, and fifth grades who are proficient but unmotivated and not meeting growth expectations, according to EOG data, attending this International Baccalaureate Organization (IBO) World, North Carolina elementary school. This site selected Mastery Learning because of its record of accomplishment of relevance over decades of research. Teachers at Pink Elementary began using the Mastery Learning framework at the beginning of the 2017 school year to motivate students to master Common Core State Standards with varying degrees of success.

Based on the North Carolina School Report card, Pink Elementary consistently

did not meet growth expectations for the EOG test achievement scores for reading, science, and mathematics in the district. The data outlined in Table 1 show the breakdown of the reading, science, and mathematics scores in relation to district and state.

Table 1

2016-2017 NC School Report Card EOG Score Comparison for Common Core State Standards Assessed

	<u>Grade 3</u>		<u>Grade 4</u>		<u>Grade 5</u>		<u>Overall</u>	
	Reading	Math	Reading	Math	Reading	Math	Reading	Math
Pink Elementary	66.5%	66.7%	79.8%	61.7%	83.2%	78.9%	76.5%	69.1%
# of tests taken	120	120	110	110	93	93	323	323
District	59.5%	65.4%	59.7%	59.8%	61%	59.8%	60.06%	61.6%
State	57.8%	63.6%	57.7%	58.6%	56.6%	60.3%	57.3%	60.8%

The data reported in Table 1 show that Pink Elementary is above district and state averages for EOG scores in reading and math in third, fourth, and fifth grades.

The data outlined in Table 2 show the breakdown of the growth measurement scores in relation to the state.

Table 2

Academic Growth Scale for NC Schools

<u>Growth range</u>	<u>Growth status</u>
85-100	Exceeded
70-84.9	Met
50-69.9	Not met

Table 2 displays the Academic Growth Scale for North Carolina Schools. School

performance growth is determined by using the following formula: school performance score = (.8 x achievement score) + (.2 x growth score; North Carolina School Report Card, 2017).

Table 3

Academic Growth History

Year	Growth	Status
2014	77.6	Met growth
2015	84.9	Met growth
2016	82.9	Met growth
2017	57.1	Not met

According to Table 3, the NC School Report Card for Pink Elementary School's growth over 4 years is presented. The school was on a positive trajectory for 2014, 2015, and 2016 for meeting growth as identified by the state of North Carolina. However, in 2017, the school fell under the "not met" category for growth with a score of 57.1.

At the beginning of the 2017-2018 school year, Pink Elementary teachers attended a professional development seminar on Mastery Learning and best practices for the framework to aid in increasing the school's growth score. During this professional development, fidelity of implementation of the program was used and explained. Practices that were recommended were clarified, and the plan for implementation for Mastery Learning was presented. At the conclusion of the professional development, a question and answer session was held. From this professional development, staff were instructed to begin using the Mastery Learning program immediately at the beginning of the school year with fidelity. There were follow-up trainings held at the school

occasionally to continue to familiarize teachers and staff with the Mastery Learning teaching framework. The principal evaluated teachers during lessons taught to students and offered support in leveled groups by ability to assist in implementation of the program. Multiple research documents were distributed to teachers during faculty meetings for reading on the framework.

The idea of Mastery Learning contrasts with the classic teaching model where all students are given the same amount of time to learn. The classic model of teaching has a focus on differences in ability. Carroll (1989) argued that natural ability is primarily a measure of time required to learn. The idea of Mastery Learning is a fundamental shift in responsibility for teachers; where the blame for a student's failure lies within the instruction, not a lack of ability of the student. Levine (1985) and Bloom (1981) explained that the challenge of a Mastery Learning classroom is providing enough time and engaging instructional strategies so all students can achieve the same level of learning.

Block (1971) defined the key elements in the Mastery Learning framework: (a) clearly specifying what is to be learned and how it will be evaluated, (b) allowing students to learn at their own pace, (c) assessing student progress and providing appropriate feedback or remediation, and (d) testing that final learning criteria has been achieved.

Research Questions

As part of doctoral coursework, an initial study of the Mastery Learning framework at a different site occurred; however, when the study was not approved as designed for the selected district for continued study in the dissertation, I sought out a

new school implementing the framework to study. The study then moved to another district with a single school in a suburb of the southwest piedmont of North Carolina. However, at the new site, I was no longer part of the staff, which limited the data that could be collected. I was interested in describing the efforts of teachers to implement Mastery Learning's four key elements as the site worked to implement the Mastery Learning framework. While Pink Elementary School held a school performance grade of B in their school performance grade history, this study builds on initial findings of "not met" EOG growth scores of students in third, fourth, and fifth grades at Pink Elementary School and the need to meet growth as defined by the state. The primary research questions are based on the four key elements of the Mastery Learning framework, as defined by Bloom (1971). The research questions include

1. How can teacher efforts to specify learning and how it will be evaluated at a site working to implement the Mastery Learning framework be described?
2. How can teacher efforts to allow students to learn at their own pace at a site working to implement the Mastery Learning framework be described?
3. How can teacher efforts to assess student progress and provide appropriate feedback or remediation at a site working to implement the Mastery Learning framework be described?
4. To what extent are final learning criteria tested and achieved at a site working to implement the Mastery Learning framework?

Researcher's Role

I established a positive relationship with the administrator at Pink Elementary School as friends for 15 years. I sought out the administrator for support in this study

through friendly conversations about data and the need to meet growth as defined by the state of North Carolina at Pink Elementary School. I led critical discussions about the direction of the school and listened to feedback from teachers represented from third-, fourth-, and fifth-grade levels.

As a part of the study, I examined Pink Elementary School's North Carolina Teacher Working Conditions Survey (NCTWCS) to analyze the culture and school improvement efforts. NCTWCS is a detailed survey with data that can support a school's ability to identify and initiate school improvement efforts. NCTWCS (2018) indicated the faculty and staff have a shared vision and positive culture. These areas in NCTWCS received an 80% or higher response in agreement from staff members. The research process was assisted through these positive relationships created by me, the administrator, and all involved. In order to support participants in being honest, I asked for participant transparency and open and honest feedback to support getting the best data possible.

Summary

The purpose of this study was to examine teacher efforts at Pink Elementary School in implementing all four key elements of the Mastery Learning framework. Specifically, this study examined teacher efforts to specify learning and its evaluation, teacher efforts to allow students to learn at their own pace, teacher efforts to assess student progress and provide appropriate feedback or remediation, and the extent to which final learning achievement and criteria were achieved. Chapter 2 provides a literature review where the following topics are examined: history and design of Mastery Learning, specifying what is to be learned and how it will be evaluated, students learning

at their own pace, assessing student progress, providing feedback, providing remediation, and testing final learning criteria has been achieved. Chapter 3 discusses the methods used to examine the four research questions at Pink Elementary School. Chapter 4 examines in greater detail the findings from the research conducted at Pink Elementary School, and Chapter 5 further describes determined conclusions, discussions, and recommendations.

Chapter 2: Literature Review

In order to fully understand the Mastery Learning framework within the wider research spectrum, this chapter examines multiple literature sources providing research pertaining to history and design of Mastery Learning, specifying what is to be learned and how it will be evaluated, students learning at their own pace, assessing student progress, the critical role feedback and remediation play in increasing achievement, and testing final learning criteria has been achieved. Each of these topics concludes with how the topic relates specifically to Mastery Learning. In addition, a section is provided explaining the rationale for the methodology used in this study.

History and Design

Mastery Learning is a coherent approach to instruction and has been found effective over decades of research. This research begins as early as 1975 and is as recent as 2019. Mastery Learning is consistently referred to as a set of strategies that are effective for supporting student learning. Block and Anderson (1975) defined Mastery Learning as a set of group-based, individualized teaching and learning strategies based on the premise that students will achieve a high level of understanding in a given domain if they are given enough time. Mastery Learning stems from Benjamin Bloom at the University of Chicago. Bloom (1981) created a series of investigations on student learning outcomes. He found that students fluctuate widely in their learning rates; however, virtually all students learn well when they are provided with the necessary time and appropriate learning conditions (Guskey, 2009). Bloom reasoned that if teachers could find the time and provide the appropriate conditions, all students would be able to reach a high level of learning (Guskey, 2007). Bloom (1968b) first considered how

teaching and learning take place in typical group-based classrooms. He found that most teachers begin by dividing the concepts and skills they want students to learn into smaller learning units. After instruction on the unit, teachers give an assessment to determine how well students did on the unit. Based on the assessment results, students are sorted, ranked, and assigned grades (Guskey, 2007).

When teaching and learning proceed in this manner, Bloom (1968b) found that only a small number of students learn successfully. Bloom (1968b) then drew upon two additional sources of information. He first considered the ideal teaching and learning situation of one student and one teacher. Bloom (1968b) tried to determine what crucial elements in one-to-one teaching could be transferred to group-based instructional settings. Second, he reviewed descriptions of the learning strategies of academically successful students in group-based learning environments that distinguish them from their less successful classmates. Bloom (1968b) saw value in organizing the concepts and skills to be learned into units and assessing student learning at the end of each unit as useful instructional techniques. Nevertheless, classroom assessments most teachers used seemed to do little more than show their initial instruction was not appropriate for the students. Bloom (1968b) believed that a far better approach would be for teachers to use their classroom assessments as learning tools and then follow those assessments with feedback and corrective teaching. With this in mind, Bloom (1968b) outlined an instructional strategy to make use of this feedback and corrective procedure, labeling it Learning for Mastery, and later shortening it to simply Mastery Learning (Bloom, 1971).

Bloom (1978) further emphasized his belief that instruction in Mastery Learning classrooms should focus on higher level learning goals, not simply basic skills. He noted,

I find great emphasis on problem solving, applications of principles, analytical skills, and creativity. Such higher mental processes are emphasized because this type of learning enables the individual to relate his or her learning to the many problems he or she encounters in day-to-day living. These abilities are stressed because they are retained and utilized long after the individual has forgotten the detailed specifics of the subject matter taught in the schools. These abilities are regarded as one set of essential characteristics needed to continue learning and to cope with a rapidly changing world. (Bloom, 1978, p. 578)

Relevant research studies have shown Mastery Learning to be particularly effective when applied to instruction focusing on higher level learning goals such as problem-solving, drawing inferences, deductive reasoning, and creative expression (Arredondo & Block, 1990; Blakemore, 1992; Clark et al., 1983; Mevarech & Werner, 1985). When implemented well, the process helps teachers improve student learning in a broad range of learning goals from basic skills to highly complex cognitive processes.

Despite the nature of the changes required to implement Mastery Learning, research evidence gathered over a long period of time in Asia (Kim, 1969, 1970; Wu, 1994), Australia (Chan, 1981), Europe (Hymel & Dyke, 1993; Langeheine, 1992; Mevarech, 1981; Postlethwaite & Haggarty, 1998; Reezigt & Weide, 1990; Yildiran, 2006), South America (Cabezón, 1984), and the United States (Anderson, 1994; Block et al., 1989; Guskey & Pigott, 1988; Walberg, 1988, 1990) shows that careful and systematic application of Mastery Learning principles can lead to significant improvements in student learning. Some researchers even suggest that the superiority of Japanese students in international comparisons of achievement in mathematics operations and problem-

solving may be due largely to the widespread use in Japan of instructional practices similar to Mastery Learning (Guskey, 2007).

Mastery Learning will not solve all the complex problems facing educators.

Nevertheless, careful attention to the elements of Mastery Learning allows educators at all levels to make great strides in their efforts to reduce the variation in student achievement, close achievement gaps, and help all children to learn excellently. (Guskey, 1989, p. 439)

In some instances, Mastery Learning has been confused with the concept of “mastery goals” used in motivation research (Ames, 1992; Dweck, 1986). Although theoretically related, these concepts are quite distinct. Mastery Learning relates to a theory about learning and an accompanying set of instructional strategies, as described above. Mastery goals consist of a central distinction drawn by achievement goal theorists between striving to acquire skill and develop understanding (mastery goals) and striving to demonstrate superiority relative to others (performance or ability goals; Butler, 2000). Mastery goals are typically associated with defining competence relative to task demands, attributing outcomes to effort, preferring challenging tasks, perceiving difficulty as an indication of the need for further learning, and responding to difficulty by seeking help and additional information. In contrast, performance or ability goals lead to defining competence relative to others, attributing outcomes to ability, interpreting difficulty as indicative of low ability, and refraining from exposing inadequate ability by seeking help (Butler, 2007). Hence, while the criteria-referenced orientation of Mastery Learning clearly focuses on mastery goals, the concepts are quite different.

In order to fully understand the Mastery Learning framework within the wider

research spectrum, I examined multiple studies spanning over decades that provide research pertaining to the framework of Mastery Learning and the effects of Mastery Learning implemented at different sites over time. The successes of students were studied from the implementation of this framework and the role it plays in increasing achievement in students working at their own pace, assessing and remediation, and testing for final achievement outcomes.

Specifying What Is to Be Learned and How It Will Be Evaluated

Gentile and Lailey (2003) began Chapter 2 of this book with the title, “Assessing fundamentals in every course through Mastery Learning.” The reasoning behind Gentile and Lailey’s use of Mastery Learning comes from the significance of teaching objectives. Teachers may have a false assumption that objectives have been mastered but are taking the prerequisite knowledge that is necessary for granted. The knowledge or skill taught can never be assumed as mastered. In order to determine mastery of knowledge taught, an assessment must be given. A wholesome curriculum will spiral around the great ideas, principles, and values of a field (Gentile & Lailey, 2003). This journey of learning begins with a single step that is little or no knowledge and ends with a mastery of knowledge at the end. It is critical for the curriculum to spiral back to and build on previous learning with this model. The overarching goal is to assure the mastery of fundamental skills by systematic testing.

Bloom (1968a) found that most teachers begin by dividing the concepts and skills they want students to learn into smaller learning units. Following instruction on the unit, teachers administer an assessment to determine how well students have learned those concepts and skills. The assessment signifies to students the end of the unit and the end of

the time they need to spend working on the unit material. It also represents their one and only chance to demonstrate what they have learned. Based on the assessment results, students are sorted, ranked, and assigned grades. Bloom's (1976) research suggested there is a discrepancy between sorting and grouping students, working on the material, and actual classroom implementation, even within the schools.

In addition, there have been conflicting studies of Mastery Learning in the classroom and differences of opinion over which aspects of Mastery Learning may make it worthwhile. Bloom (1971) reported that in the original model for Mastery Learning, guidelines were recommended. Of these recommended guidelines, implementations that have not tended to be successful were flawed. Flaws may occur in either design or implementation due to failure to establish priorities among instructional objectives; failure to organize objectives into instructional units and to order/sequence the units based on rational considerations (priority to objectives); failure to properly orient the students to Mastery Learning programs; or failure to make rational, justifiable decisions about performance standards.

To summarize, the following strategies should be in place in classrooms to support specifying learning: The teacher must begin with a purpose with regard to prioritization and organization of objectives as well as an outline for communication of those objectives. Brookfield and Preskill (1999) stated that a teacher should consider their goals for each lesson or unit. Appropriate questions for a teacher to ask are, "How do the ideas and information to be discussed fit into the subject as a whole" and "What skills, knowledge, perspectives, or sensibilities do you want students to walk away from the lesson with?" Brookfield and Preskill added that goals for a particular lesson should be

consistent with your course objectives and values as a teacher.

Students Learning at Their Own Pace

A diverse classroom can be described as one where students of different abilities, backgrounds, and experiences are in one class. This describes every classroom today. According to Wright and Wright (1994), the special education term “inclusive” is important and is used either alongside the term “diverse” or on its own. It is tied to the mandate that elementary, middle, and high schools provide the least restrictive environment to their special needs students (Wright & Wright, 1994). According to Wright and Wright,

Least Restrictive Environment means that to the maximum extent appropriate, school districts must educate students with disabilities in the regular classroom with appropriate aids and supports, along with their nondisabled peers in the school they would attend if not disabled unless a student's Individualized Education Plan (IEP) states otherwise. (p. 18)

Having this diverse group of students in a classroom means the teacher must be able to recognize that all students are unique in their own special way.

At a glance, every classroom has a range of students with different kinds of needs—there are students who are above grade level and others who are behind. Some learn best by working with others, and others prefer working alone. Some students need special help along the way to fill in areas where they struggle (Osewalt, 2014). Osewalt (2014) continued, stating, “The best teachers reach all their students by giving the whole class a great experience but they change up the material a bit for each student so everyone learns at their own pace” (p. 1). Individualized, self-paced instruction focuses on the

needs of an individual student. In this specific type of instruction, Osewalt classified it as a type of teaching where teaching is specific and targets one need at a time. Individual students may need teachers to help them learn and understand, while other students may skip topics they already know and go on to more advanced information.

A misinterpretation stems from some early attempts to apply Mastery Learning that were based on narrow and inaccurate understandings of Bloom's (1968a) theory. These efforts focused only on low-level cognitive skills, attempted to break learning down into small segments, and insisted that students “master” each segment before being permitted to move on. Unfortunately, as a misinterpretation of Mastery Learning, teachers were regarded in these programs as little more than managers of materials and record-keepers of student progress (Prawat, 1992; Satterly, 1981). Nowhere in Bloom's (1968a) writing, however, can this kind of narrowness and rigidity be found. In fact, Bloom (1968b) emphasized quite the opposite. He considered thoughtful and reflective teachers vital to the successful implementation of Mastery Learning and continually stressed flexibility in its application. In his earliest description of the process, Bloom (1968b) wrote,

There are many alternative strategies for Mastery Learning. Each strategy must find some way of dealing with individual differences in learners through some means of relating the instruction to the needs and characteristics of the learners....

The non-graded school (Goodlad & Anderson, 1959) “is one attempt to provide an organizational structure that permits and encourages Mastery Learning.” (pp.

7-8)

Flexible groups are a significant part of students learning at their own pace. Those

groups are based on student individual needs and interests. Individualized, self-paced instruction targets the needs of each individual student. Heathers (1977) stated,

Individualized instruction consists of any steps taken in planning and conducting programs of studies and lessons that suit them to the individual student's learning needs, learning readiness, and learning characteristics or learning style. These specific learning needs have the ability to be identified with the grade level curriculum or they can be seen as reflecting of individual experiences and interests. Planning can include a careful appraisal of whether or not each student possesses the readiness to undertake a given learning program or lesson, or it may fail to do so. (p. 342)

Heathers added that instruction delivery can give more or less attention to the students' most effective or preferred ways of learning through concrete or abstract approaches, working in groups or working alone, and other expressions of learning style.

To summarize, the following strategies should be in place in classrooms to support students learning at their own pace: begin with implementing strategies to meet each individual learner's needs; next step in the Mastery Learning framework is the use of flexible grouping to target the needs of each student. Upon students learning at their own pace, the succeeding step in the Mastery Learning framework is assessing students. Teachers are able to assess students to check their progress.

Assessing Student Progress

Darling-Hammond (2015) spoke out on assessment:

Assessment is at the heart of education: Teachers and parents use test scores to gauge a student's academic strengths and weaknesses, communities rely on these

scores to judge the quality of their educational system, and state and federal lawmakers use these same metrics to determine whether public schools are up to scratch. Testing forms the bedrock of educational assessment and represents a commitment to high academic standards and school accountability. You cannot know where you are going unless you know where you are. (p. 1)

According to Bloom (1968a), teachers have the tendency to over-test. There tends to be too much reliance on individual teachers to develop corrective alternatives and testing procedures. In addition, error analysis of formative tests are not linked to specific correctives and lack of variety in corrective procedures. There is a lack of consistency in advancement. Teachers typically move on to the next unit without at least 80% of the group of students reaching 80%-85% mastery. There is no flexibility in the period allocated to corrective teaching (reteaching) particularly in early units. An insufficient staff development exists, leading to teachers not understanding major assumptions or teaching strategies of the Mastery Learning approach. There are no implementation checks; no programs developed for those students who master after the first formative test, i.e., extended learning or opportunities for tutoring; no plan to deal with consistent non-masters; no strategies for handling initial cognitive entry differences; lack of continuity of teaching staff and administration; and insufficient record keeping (Bloom, 1968b).

Ellis (2019) identified the missing link that Bloom (1968b) wrote about. Ellis explained that teachers need clear processes to assess mastery. These processes must also be fully scalable so it is feasible for teachers to assess mastery for every student and every learning objective (remembering that some students may need multiple attempts to

demonstrate mastery depending on their level of readiness and the potential variety of assessment options available). In order to close the gap for implementation and to make it feasible for teachers to assess mastery for every student, Bambrick-Santoyo (2010) found that teachers need to share their best practices with each other. Bambrick-Santoyo (2010) recommended teachers start by creating common monthly math assessments and analyze the results to determine which skills needed whole-class instruction, small-group reteaching, or individual support. Analyzing the results as a grade-level team allows for collaboration. If one teacher had better results on one standard and another did better on a different standard, the team could regroup all the students from the grade into groups that were taught by the teacher most skilled at that particular standard (Bambrick-Santoyo, 2010).

Best practices for assessment lie in frequent student progress checks and dynamic responses to student data, according to Hanover Research (2012). Hanover Research also found that student progress tracking can be effective when the following guidelines are used:

1. Address a single goal within an assessment. Each assessment item should be tied to a single goal, enabling accurate tracking of concept mastery.
2. Use rubrics instead of points. The best results are seen when students are assessed on a rubric rather than given points for correct answers. A point system can be skewed from assessment to assessment, depending on the number of difficult and easy items per test. A rubric scoring system can simply indicate whether each question reveals mastery of the topic or if work is needed.

3. Use different types of assessments. Demonstrations, probing discussions, unobtrusive observations, and student-generated assessments can be combined with standard question and answer assessments to accurately measure student understanding.

The use of continued assessment will not only help teachers to direct the course of student learning and increase student engagement with their own learning goals but can also increase student motivation to learn (Hanover Research, 2012). Individuals are motivated by demonstrations of success and competence. Mastery Learning environments provide personalized and self-paced learning, allowing continual assessment that can enhance motivation in students.

Data-driven instruction has been touted as a key framework to increasing student achievement; however, with every school that achieves and experiences success with this model comes a school that falls short, due to unknown factors. Keys of driven by data, as laid out by Bambrick-Santoyo (2010), are “assessments, analysis, action, [and] culture” (p. 3). These keys line up with components of the Mastery Learning framework. “Teachers have rigorous assessments that drive great teaching, and they do deep analysis of interim assessment results to make in-course corrections that guarantee higher student learning results” (Bambrick-Santoyo, 2010, p. 3).

Larmer (2016) asked why assessing student learning was important to several teachers. They all emphasized the more active role of students in the process. Kelly Reseigh stated, “Kids need to know where they’re at both in relation to standards and personally what their goals are” (Larmer, 2016, p. 1). She pointed out that traditionally, teachers say, “I know my kids”; but it is not enough for teachers to know their kids, it is

important for the kids to know themselves as learners. Assessment practices should reveal useful information and give students an opportunity to reflect on their progress. “Students are hungry for feedback,” agreed Michelle (Larmer, 2016, p. 1). Larmer pointed out that the process can tend to be lengthy, yet students need to know where they are in the process so that assessment can be celebratory and show growth.

In summary, Mastery Learning supports the following assessment practices: consistency in advancement and students not moving forward to the next topic, standard, or skill without at least 80% of mastery on an assessment. Mastery Learning also supports reteaching, extended learning, or tutoring for students who did not master after the first formative assessment. Frequent student progress checks and dynamic responses to student data are also best practices for assessment and student motivation to learn (Hanover Research, 2012).

Providing Feedback

Bloom (1971) observed that teacher traditional practice was to organize curriculum content into units and then check on student progress at the end of each unit. These checks on learning progress would be much more valuable if they were used in conjunction with the teaching and learning process to provide feedback on student individual learning difficulties and then prescribe specific remediation activities. Following high-quality instruction from the teacher, there is a formative assessment that will be distributed (Bloom et al., 1971). Formative assessment used will identify specifically what students have learned and where they need additional work. The formative assessment will include explicit targeted suggestions about what students must do to correct their learning difficulties and master the desired learning outcomes (Guskey,

2010).

Assessment has become complicated in its many forms and purposes. Not just assessment, however, especially classroom assessment (Earl, 2003). Classroom assessment must satisfy many goals. These goals of classroom assessment include providing feedback to students, offering diagnostic information for the teacher to use, providing summary information for recordkeeping, offering evidence for reports, and directing efforts at curriculum and instructional adaptations (Earl, 2003). Assessment as learning goes to the deepest point and draws on this role of personal monitoring and challenging of ideas that are in the learning process and within the role of teachers and students through the self-regulation process (Earl, 2003). To focus on this type of learning, teachers and administrators have to dig and think deeper...thinking about the futures of children, teaching profession, schools, and society (Earl, 2003).

“The King’s Medway, Oxfordshire Formative Assessment Project set out to help teachers transform formative assessment ideas gleaned from research studies into working practice into the classroom” (Black et al., 2003, p. 30). The ideas that motivated these teachers to change their practice from *Inside the Black Box* by Black et al. (2003) were used for the teachers and were a part of the Pink Elementary study. They include questioning, feedback, sharing criteria, and self-assessment. An example is “communicating links between teachers and their students about the assessment aspects of their work” (Black et al., 2003, p. 31). Communicating with the students as a teacher, explaining where the specific disconnect is, and taking the time to correct thinking and mistakes show the students the teacher is invested and has time for them. Further, applying face-to-face discussions and judging student responses to feedback on their

written work (Black et al., 2003) are actions that show students the teacher has invested the time to read their work, reflect on their thinking, and locate disconnects or inform the student on how they could improve their work. This in turn allows learners to decide how to make judgments about their own work as well as how to structure their next piece of work. Finally, Black et al. (2003) found,

The very clear messages from the students were that they wanted their teachers:

1. To not use red pen because students felt it ruined their work.
2. To write legibly so that the comments could be read.
3. To write statements that could be understood. (p. 44)

Concluded from research supported by Black et al. (2003), with regard to feedback, remembering that giving feedback is important, showing investment in students work by reading it, reflecting on student thinking, locating disconnects, and informing students of the ways in which they may improve their work were a few of the reminders kept at the forefront of the teachers' minds. Once the teacher has provided an assessment and given the student feedback from the assessment, the next step in the Mastery Learning framework is to provide remediation to students who did not master part or all of their assessment.

Providing Remediation

Remediation as related to Mastery Learning is designed to assist students in order to achieve expected competencies in core academics such as reading or math.

Remediation is designed to close the gap between what a student knows and what they are expected to know (Understood, 2014, p. 2). Understood (2014) stated that solid remediation includes

1. Research based teaching methods.
2. Teaching step-by-step, not skipping over content.
3. Remediation that is conducted at the student's pace.
4. Regular reviews and practice exercises to reinforce learning and practice applying new knowledge.
5. Ways to assess what the student has learned and whether they are ready to move ahead.

According to Guskey (2010), once students complete their corrective activities or remediation, which should take a class period or two, they will need to take a second parallel formative assessment. This assessment should address the same learning goals of the unit but include somewhat different problems, questions, or prompts. This second formative assessment solidifies whether or not the remedial activities and lessons are successful in assisting the student in overcoming their individual learning difficulties. This can also serve as a motivational tool for students who need a second chance to succeed. In addition to corrective or remedial activities, Bloom (1978) recommended that teachers plan enrichment activities for students who have demonstrated proficiency on an assessment. These enrichment activities allow students to have exciting activities to broaden and expand their learning.

Bambrick-Santoyo (2010) showed insight in identifying the common disconnect between what the teacher is teaching and what the interim assessment was measuring. This insight brought about a deeper look at assessments on all levels of teaching (Bambrick-Santoyo, 2010). Pink Elementary utilized collaborative efforts through professional learning communities (PLCs) that were able to analyze results together and

establish common goals. This strategic decision at Pink Elementary School was made to create individual student action plans in order to reteach difficult standards according to teacher strengths. Action plans and reteaching according to a teacher's strength can be a creative approach to making teaching more effective.

Even after supports are in place for students prior to the lesson and the teacher has provided them with targeted intervention during the lesson, there still can be a handful of students who do not understand the concepts or still cannot demonstrate mastery of the required skills. Remediation is an opportunity to provide additional support to those students who do not understand key concepts in spite of attempts to support them. According to Lambert and Jackson (2010), there are two types of remediation: short-term and ongoing remediation. Short-term remediation is designed to get students ready for the summative assessment. Ongoing remediation focuses on long-term skill development to address large gaps in background knowledge or basic skills. Not everything being taught needs to be remediated. Skills taught again in later units that are not essential to mastery may not be necessary. However, students who struggle with material that makes up a substantial part of the assessment content or skills may need to be remediated, or students who need additional support with material that is critical to the next unit or later units of study may need to be remediated. Remediation may also occur with specific concepts where the student displays a need for intervention. Further, Lambert and Jackson clarified steps to assess students who need remediation. These steps included

1. Constantly analyze formative data to determine students with deficits in their learning.
2. Determine all students close to mastery.

3. Determine students who need intensive remediation.
4. Identify students who struggle with context (test structure) rather than content.

Selecting effective remediation strategies requires that a teacher find out as much as they can about why a student is still struggling. Students do not have to be retaught all the material; they probably have gaps in understanding that have prevented them from grasping key concepts.

Another important aspect in remediation is error analysis. Lambert and Jackson (2010) determined steps for best practice in error analysis to be

1. Have student review first assessments to analyze errors.
2. Determine and present probable causes of error.
3. Determine how to prevent this error in the future.
4. Students should present an error analysis before they can retest.

Error analysis guides the teacher to reteaching and remediation. Teaching concepts the students do not understand using a different method assists students in achieving expected competencies in core academics. Reteaching should occur shortly after student assessment shows they did not understand much of the material and focus only on the key concepts and skills students need to know. This type of reteaching should be significantly different from regular instruction. Remediation and error analysis should not create additional work for students (Lambert & Jackson, 2010). Practice should focus on helping students develop fluency and proficiency. This practice should be distributed over a period of time using several sessions. Practice should be meaningful, short, and most importantly have built-in feedback.

The final step to remediation is to reassess after providing the corrective reteach

lessons to the student. This type of reassessment is to improve learning without focusing on grades and is utilized only when it helps students learn information they need to move on. Reassessment may occur in a new or different format, as applicable but as close to the original assessment as possible (Lambert & Jackson, 2010).

In summary, remediation within the Mastery Learning framework consists of the following: closing the gap between what a student knows and what they are expected to know, utilizing research-based teaching methods, teaching step-by-step and not skipping over content, remediation that is conducted at the student's pace, reinforced learning and practice applying new knowledge, and assessing what the student has learned and whether the student is ready to move ahead.

Testing Final Learning Criteria Has Been Achieved

A study by Whiting et al. (1995) representing 18 years of data gathered from more than 7,000 high school students showed Mastery Learning to have remarkably positive influence on student test scores and grade point averages as well as their attitudes toward school and learning. Another field experiment conducted in elementary and middle school classrooms showed that the implementation of Mastery Learning led to significantly positive increases in student academic achievement and their self-confidence (Anderson et al., 1992). Even more impressive, a comprehensive, meta-analysis review of the research on Mastery Learning by Kulik and Kulik (1989) concluded,

We recently reviewed meta-analyses in nearly 40 different areas of educational research. Few educational treatments of any sort were consistently associated with achievement effects as large as those produced by Mastery Learning. In

evaluation after evaluation, mastery programs have produced impressive gains. (p. 292)

Relevant research evidence over decades also shows that the positive effects of Mastery Learning are not limited to cognitive or achievement outcomes. The process also allows for improvements in student confidence in learning situations, school attendance rates, engagement in class activities, attitudes toward learning, and a variety of other affective measures (Block & Burns, 1976; Block et al., 1989; Guskey & Pigott, 1988, Whiting & Render, 1984).

It should be noted that one review of the research on Mastery Learning, contrary to all others, indicated that the process had essentially no effect on student achievement (Slavin, 1987). This finding surprised not only researchers who were familiar with the vast research on Mastery Learning showing it to provide positive results but also large numbers of teachers and researchers who had experienced its positive impact firsthand. A close observation of this study shows that it was conducted using techniques of questionable validity. Joyce (1987) and Hiebert (1987) employed variable selection criteria, while Anderson and Burns (1987) and Kulik et al. (1990) reported results in a biased manner. Two much more extensive and methodologically sound reviews published since Guskey and Pigott (1988) and Kulik et al. (1990) have verified Mastery Learning's consistent positive impact on a broad range of student learning outcomes.

Researchers in the 21st century generally recognize the value of the central elements of Mastery Learning and their importance in effective teaching at any level of education. Similar elements provide the foundation for more recently developed instructional approaches, including differentiated instruction (Tomilson, 2003) and

understanding by design (Wiggins & McTighe, 2005). As a result, fewer studies focus on the Mastery Learning process. Instead, researchers are looking for ways to enhance results further, adding additional elements to the Mastery Learning process that positively contribute to student learning in hopes of attaining even more impressive gains (Bloom, 1984a, 1984b, 1988; Walberg, 1990). Recent work on the integration of Mastery Learning with other innovative strategies appears especially promising with regard to increase of student achievement (Arredondo & Block, 1990; Guskey, 1988, 1990, 1997; Motamedi & Sumrall, 2000).

In Mastery Learning, assessments are not a one-shot, do-or-die experience; instead, they are part of an ongoing effort to help students learn (Guskey, 2010). After corrective activities, Mastery Learning teachers give students a second formative assessment that is parallel to the first assessment that helps determine the effectiveness of the corrective instruction and offers students a second chance to demonstrate mastery and experience success. Response to Intervention similarly requires frequent assessment of student learning progress to check on the effectiveness of intervention strategies.

According to Guskey (2010), Mastery Learning teachers make a point of recognizing those students who do well on the initial formative assessments. However, they also acknowledge that students who do well on the second formative assessment have learned just as much and deserve the same grades as those who scored well on their first try. Students who engage in corrective activities and eventually show that they too have learned well deserve the same treatment as students who scored well on their first try.

Effectiveness

In order to fully understand the effectiveness of the Mastery Learning framework within the wider research spectrum, this section examines multiple studies providing research pertaining to the effects of Mastery Learning implemented at different sites. The successes of students were studied from the implementation of this framework and the role it plays in increasing achievement in students working at their own pace, assessing and remediation, and testing for final achievement outcomes.

In Turkey, the effects of Mastery Learning were studied against the success of students. Kuzu et al. (2005) deemed learning as one of the most important necessities of life. “As humans, we spend our whole lives learning to be something. Each individual is part of a group” (Kuzu et al., 2005, p. 233). The teacher in conventional settings chooses the program and education. Each student brings individual learning abilities to the table, which are completely different from the other students in the class. When teaching by groups of the whole class, the individuals are expected and set up to be successful. Kuzu et al. completed a study in a university in 2003. The goal was to determine effects of Mastery Learning on the successes of the students enrolled in a specific course. The findings indicated that students experiencing Mastery Learning scored significantly higher than students who did not.

In another study in Iran, the effect of Mastery Learning method on performance and attitude of weak students in chemistry was considered. In this research by Damavandi and Kashani (2010), which was done experimentally, 40 high school students who were 16 years old were randomly organized into one control and one experimental group of 20 students each after selection and matching. The experimental group was taught in

Mastery Learning method and the control group was taught in common method. In this study, a chemistry questionnaire (Class-Chem) and an academic achievement test were implemented on both groups as a pretest and posttest. Following the academic achievement test, a multivariate variance analysis method was used in order to determine the effect of the learning method on each of the groups; and the following results were obtained after data analysis:

1. Mastery Learning method was more effective on performance of weak students than the common learning method.
2. Mastery Learning method caused an increase in positive changes in attitude of weak students to chemistry learning.

For studying the difference of test and control groups in chemistry learning and changes of their attitude after learning, post and pretests of both groups were studied with a Multivariate Analysis of Variance (MANOVA). For this purpose, covariance-variance homogeneity tests and then Levine tests were performed on data. For testing the difference of the groups in each one of the dependent variables, a unilateral variance analysis was separately used.

With regard to results included in the study, ratio of F obtained for change of performance in low level of learning is not significant in 95% of confidence coefficient ($P > 0.05$) but ratio of F obtained for change of performance in high level of learning is significant in 99% of confidence coefficient ($P < 0.01$).

Therefore, one can say that the first hypothesis that Mastery Learning method is more effective on promotion of chemistry performance of students than the common learning method is confirmed. (Damavandi & Kashani, 2010, p. 1575)

According to Kampen (2019), as part of a key study in 1990, researchers decided to study the impact Mastery Learning could have on mainstreamed special education students in a Missouri elementary school. Forty students considered mildly disabled or at risk were put into regular classroom instruction. The teacher taught a lesson and then administered a formative assessment. Students who did not receive between 80% and 90% on the formative assessment worked with a special education teacher in the classroom to correct, intervene, and reteach. Students who achieved mastery continued to work with the classroom teacher on enrichment activities. Researchers divided students into five groups, based on data from the Missouri Mastery Achievement Test (MMAT). Before the new program was introduced, 40% of students were in the two lowest groups. After only 2 years of mastery learning, just 10% were in the bottom two groups, and student MMAT scores increased by 13.46% overall (Kampen, 2019).

Implementation Fidelity

Fidelity of implementation is important in educational research. Fidelity can be tied to educational policies and improvement, such as Mastery Learning. Meyers and Brandt (2015) explained that implementation fidelity encompasses the degree to which a program or intervention is delivered as planned. Further, implementation fidelity is a key issue for every program developer and researcher designing, executing, interpreting, or communicating their work (Meyers & Brandt, 2015). Dusenbury et al. (2003) explained that fidelity of implementation is generally associated with improved student outcomes and with changes in factors that can mediate the effects of interventions. Dane and Schneider (1998) described three different positions on this count: (a) fidelity—interventions should be delivered as intended without adaptation; (b) pro-adaptation—

providers should modify interventions to fit the settings in which they are delivered; and (c) compromise— accommodations can be made as long as the critical components of the intervention remain intact.

The research around fidelity informs this study by improving the understanding regarding the levels of use of Mastery Learning. Hall and Loucks (1977) explained the attempt to measure the fidelity of teachers during the implementation process insightful in understanding how the teachers implemented the Mastery Learning framework at Pink Elementary School. Additionally, Sarason (1971) gave a clear picture of why schools struggle with change. The struggle is because most if not all educators prefer to have a single answer to a problem. The fact that in nearly all situations there are multiple answers makes any type of change challenging. The research done specifically around fidelity is important; however, it is an incredibly challenging concept to measure. Research by O'Donnell (2008) and Penuel et al. (2007) explained extensively the strategies needed for successful implementation. Implementation studies are not common, and the lack of current literature creates a challenge. The early literature on implementation studies provided an exceptional foundation for current studies. Additional studies on fidelity and the important role it has in implementation, from a practical sense, assists schools as they continue to implement new curriculum, such as the Mastery Learning framework.

Summary

Third-, fourth-, and fifth-grade teachers and students at Pink Elementary School were faced with high achievement and low growth scores overall in reading and mathematics on the North Carolina EOG test. The site implemented the Mastery

Learning framework due to Mastery Learning being a framework that has a record of accomplishment of relevance over decades of research. Mastery Learning was the framework the school implemented in the fall of 2017 to increase student motivation, achievement, and growth. The Mastery Learning framework consists of specifying learning and how it will be evaluated, students learning at their own pace, assessing student progress and providing feedback and remediation, and finally testing final learning criteria to see if they have been achieved. The critical role data-driven instruction plays in increasing achievement and motivation in students and steps for successful implementation were embedded within the implementation. Examining the effects of the implementation of the Mastery Learning framework drove this study to determine what is to be learned and how it will be evaluated, allowing students to learn at their own pace, assessing student progress and providing feedback/remediation, and testing that final learning criteria has been achieved at the site implementing the Mastery Learning framework.

Chapter 3: Methodology

Implementation of Mastery Learning with fidelity can be a complex undertaking. Key elements in the Mastery Learning framework are (a) clearly specifying what is to be learned and how it will be evaluated, (b) allowing students to learn at their own pace, (c) assessing student progress and providing appropriate feedback or remediation, and (d) testing that final learning criteria have been achieved (Block, 1971). In addition, implementation of this framework requires an entire school-wide shift in mindset. In order to examine the implementation of Mastery Learning at Pink Elementary School, the method selected was a mixed methods research study where qualitative and quantitative data were used. The original approved proposal had me in a different school district, observing classroom teachers, attending PLC meetings, and reviewing lesson plans. However, when the study was not approved as designed by the identified district, it moved to another district with a single school where I was no longer a part of the staff; this limited the data that could be collected. PLC minutes and lesson plans were no longer a part of the data collection, and classroom observations could not be conducted. Instead, the research questions were examined with the following data sources: teacher perception survey, focus group data, and EOG achievement and growth scores. The IRB submitted to the university for approval was edited to reflect these changes.

A large portion of the research data for this study are qualitative with an added piece of quantitative data for support. The focus of this study was on third, fourth, and fifth grades because EOG data collected in third, fourth, and fifth grades were identified as a valid and consistent measurement of final learning criteria. The qualitative research phase included the use of a focus group with several third-, fourth-, and fifth-grade

teachers involved in the study and open-ended survey items. Survey items and consent forms were sent via email. Survey data were analyzed using descriptive statistics and frequency distributions. Analysis of focus group responses and survey data were used to identify and code themes related to the four key elements of the Mastery Learning framework. The quantitative research data included gathering EOG data collected prior to Mastery Learning compared with EOG data collected after implementation of Mastery Learning. Using a Likert scale, survey items related to teacher perceptions of implementation and its impact were analyzed. In order to study the testing of final learning criteria to examine if learning and growth had been achieved, EOG achievement and growth data for pre- and post-implementation of Mastery Learning were analyzed using an independent-samples *t* test to determine if a significant difference existed between the means of EOG scores and growth scores. To see a clearer picture of the impact of Mastery Learning on student achievement, growth, and the perception of the implementation and impact of Mastery Learning based on teacher perceptions, I triangulated qualitative and quantitative data pieces from survey data and focus group data.

To obtain a deeper understanding of how the implementation of Mastery Learning was perceived by teachers and the impact of Mastery Learning on student achievement and growth at Pink Elementary School, the exploration of the following research questions occurred:

1. How can teacher efforts to specify learning and how it will be evaluated at a site working to implement the Mastery Learning framework be described?
2. How can teacher efforts to allow students to learn at their own pace at a site

working to implement the Mastery Learning framework be described?

3. How can teacher efforts to assess student progress and provide appropriate feedback or remediation at a site working to implement the Mastery Learning framework be described?
4. To what extent are final learning criteria tested and achieved at a site working to implement the Mastery Learning framework?

Participants

The school district in which the research took place is located in a suburb of the southwest piedmont of North Carolina. The community directly surrounding the school was predominantly White. The community has seen a boom in suburban jobs and lifestyles due to accessibility, family friendly development, and an increase in job opportunities.

The community directly surrounding the school has an area of 20.93 square miles. It consists of a population of approximately 38,341 residents with an average household income of \$67,213 in 2018, compared to the 2018 state average income of \$53,369. The current percentage of poverty in this urban community surrounding the school is 9%, compared to the city average of 4.9% and the state average of 14%. The most prominent jobs in the area are banking, healthcare, and other mega corporations. The community surrounding the school is considered diverse with the population in 2018 as White 79.6%, African American 10.49%, Hispanic 9.3%, Asian 5.8%, and Indian .5%. Educational records from the 2018 U.S. Census Bureau reported that 92.4% of the population are high school graduates or higher. The U.S. Census Bureau also reported that 37.7% of the population have a bachelor's degree or higher, compared to the state average of 20.5%.

The district has 17 elementary schools. Each elementary school is comprised of varying economic and ethnic backgrounds. It also has seven middle schools, two IBO World Schools, five high schools, three early colleges, one career and technical school, and one k-12 alternative school. The student population is approximately 20,858 children. There are 1,225 teachers and 100 administrators in this school community. Forty-five percent of the students enrolled in the district are economically disadvantaged and receive free or reduced lunch. Within the district, there are several other elementary, middle, and high schools implementing the Mastery Learning framework. Some restaurants and several shopping centers can be found around the corner from the school, as well as an interstate.

Description of Work Setting

The work setting in which the study took place is a K-5 elementary facility. In the 2018-2019 academic year, Pink Elementary School had 680 students with 31 regular education teachers and a teacher-to-student ratio of 1:20. The student demographics were 71% White, 5% African American, 7% Asian, 8% Hispanic, and 5% other. The percentage of economically disadvantaged students receiving free or reduced lunch (Title I) was 25.4%.

At the time of the study, this school was an IBO World School focusing on immersing students in their personal development through unique academic rigor. IBO World Schools aim to do more than other curricula by developing inquiring, knowledgeable, and caring young people who are motivated to succeed (International Baccalaureate, 2019).

At this site, kindergarten students were expected to read, write, and communicate

orally in English by the end of the school year. However, only 21.4% of students entering kindergarten across the school were proficient readers. In addition, the school offered other services to its students and families, such as Exceptional Children, English as a Second Language, Talent Development for Gifted Students, Student Support Services, Reading Interventionists, and School Leadership Team. The building is fully equipped with a gym, a media center, two computer labs, and a book room for guided reading sets.

The school vision is, “We will provide an outstanding internationally competitive education for all Pink Elementary students.” The school mission is, “At Pink Elementary, all students are encouraged to become active, independent, inquiring, lifelong learners who will have the tools to succeed in a complex and changing world. We work collaboratively to build our community of excellence!” The values of Pink Elementary school include,

Attention to the whole child, emphasis on inquiry, utilization of a variety of learning tools and technologies, valuing a range of learning styles and abilities, exposure to diverse international perspectives, connections to the real world beyond the confines of the classroom, commitment to active service and positive action, focus on the development of positive attitudes toward people, toward the environment, and toward learning.

Through the implementation of Mastery Learning, the students have an opportunity to think, work collaboratively to master objectives in order to grow, and learn to be college and career ready. Pink Elementary puts an emphasis on small group instruction to ensure students are mastering standards before moving to the next level. The administration stated they are aware that students are not able to grow and move forward if they have

not mastered the current standards in front of them. Pink Elementary School also shares a common belief that students need appropriate feedback in order to set individual goals for themselves and grow academically. The school also aims to provide an excellent reading program to promote high reading scores and growth each year through literacy education. The school aspires to provide a global and diverse learning environment of rigor, relevance, and engagement while including high academic achievement, proficiency, and literacy in both reading and comprehension.

Finally, according to the North Carolina School Report Card, Pink Elementary School had 31 highly certified teachers, one special education teacher, one STEM teacher, five special area teachers, one instructional facilitator, one counselor, one English as a Second Language teacher, one principal, and one assistant principal. These individuals provide the academic instruction in this school.

Table 4

Years of Teaching Experience

Years of experience	Pink Elementary	District	State
0-3 years	6.1%	12.8%	21.5%
4-10 years	27.3%	26.1%	27.4%
10+ years	66.7%	61.1%	51.1%

Six point one percent of the teachers have less than 3 years teaching experience, 27.3% of the teachers have 4 to 10 years of experience, and 66.7% of the teachers have more than 10 years of experience. When examining the years of experience teachers hold at Pink Elementary School, Pink Elementary School has a much lower percentage of new teachers who have only taught 0-3 years, as compared to the district and state, which

have higher percentages. The percentage of teachers who have 4 to 10 years of experience is higher than the district percentage but lower than the state age range. Finally, Pink Elementary School is above both the district and state of teachers who have vested 10 or more years of experience in a classroom.

Teacher turnover rate in 2018 was 10.2% at Pink Elementary, which is higher than the district, 9%, and lower than the state, 12.9%. Table 5 provides a comparison of teachers with advanced degrees at Pink Elementary compared with the district and state.

Table 5

Teachers with Advanced Degrees or National Board Certification

Degree	Pink Elementary	District	State
Master's degree or higher	36.4%	30.5%	29.8%
National Board certified	2	3	4

When compared to the district, Pink Elementary School has 5.9% more teachers who hold a master's degree or a higher degree of some type. Pink Elementary School also goes above the state average in teachers with a master's or a higher degree by 6.6%. Looking at National Board certified teachers, Pink Elementary School has fewer (two teachers) than the district average of three teachers per school, as well as fewer than the state average of four teachers per school.

Pink Elementary School holds classes in kindergarten, first, second, third, and fourth grades. The average class size for each grade level can be seen in Table 6 compared to the district and state class sizes.

Table 6*Average Class Size*

Grade	Pink Elementary	District	State
Kindergarten	19	19	19
1	23	19	19
2	23	19	19
3	20	20	19
4	22	20	21
5	23	21	21

The average class sizes at Pink Elementary School show that in kindergarten, Pink is equal to the district and state when it comes to average students in the classroom. In first and second grades, Pink is above average in the district and state by four students in each class. Third grade at Pink is equal to the district with 20 students as an average but above the state average of 19, by one student. Fourth grade at Pink Elementary rises above the state and district averages with 22 students in their classes. The district average for fourth grade is 20, and the state average is 21 in each fourth-grade classroom. Fifth grade also surpasses state and district averages. Fifth grade has 23 students on average at Pink Elementary School. The district and state averages for fifth-grade class size are both 21.

Comparing Pink Elementary data with state data reveals that although the school had an average student-to-teacher ratio, the teachers were much more experienced with more advanced degrees, as specified in Tables 4 and 5.

Each year, the students in Grades 3, 4, and 5 are given an EOG test to measure student achievement in math and reading. Due to the consistency of the final learning

criteria, the EOG data, the focus of this study is on third-, fourth-, and fifth-grade teachers and students. In 2017, more than 76% of the Pink Elementary School students scored above grade level on the EOG in reading, and nearly 69% were above grade level in math as compared to 55% of the district above grade level in reading and 54% above grade level in math. However, in 2017, the growth score for Pink Elementary School was 57.1 landing the school at a growth status label of “not met,” which is the lowest of the three levels (exceeded, met, not met) a school can earn.

All teachers at Pink Elementary School, kindergarten through Grade 5, have been trained and are expected to implement the Mastery Learning framework. To focus on the EOG growth achievement scores at this school, only third-, fourth-, and fifth-grade classroom teachers (n = 14) were included in this study. The first step in data collection was to obtain the permission of the district. The next step was to obtain the permission of the school principal. The final step was to ask for the cooperation of the third-, fourth-, and fifth-grade classroom teachers at Pink Elementary School. All respondent identities were kept confidential.

Research Questions

1. How can teacher efforts to specify learning and how it will be evaluated at a site working to implement the Mastery Learning framework be described?
2. How can teacher efforts to allow students to learn at their own pace at a site working to implement the Mastery Learning framework be described?
3. How can teacher efforts to assess student progress and provide appropriate feedback or remediation at a site working to implement the Mastery Learning framework be described?

4. To what extent are final learning criteria tested and achieved at a site working to implement the Mastery Learning framework?

Research Design

In order to achieve an accurate, holistic depiction of the participants, it is necessary for mixed methods researchers to employ a multi-methods approach. I utilized a mixed methods approach to explore the research questions. According to Becker et al. (2005), in compliance with Creswell (2005), documents, records, and artifacts are necessary for triangulation of data in order to increase the accuracy of the findings of the study. I triangulated survey data, focus group data, and assessment (EOG) data to increase the accuracy and findings of this study. Mixed methods studies are defined as a combination of qualitative and quantitative approaches to research (Laerd, 2012). Newman and Benz (1998) stated that mixed methods research is less quantitative versus qualitative and more how research practices lie somewhere on a continuum between the two. “Mixed methods research is the type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches for the broad purposes of breadth and depth of understanding and corroboration” (Johnson et al., 2007, p. 123). Hammersley (1996) agreed that the combination of quantitative and qualitative methods is often proposed, on the ground that this promises to cancel out the respective weaknesses of each method.

For this study, a mixed methods study was used to address research questions by collecting quantitative data and qualitative data. Following collection of data, qualitative data were analyzed separately, looking for themes and coding them. The qualitative research phase occurred first using a survey. A focus group followed the survey to

explore issues and uncover major themes. In addition to using qualitative research methods, a quantitative research phase occurred, collecting EOG data to measure the relationship between the EOG data of the school year before implementation and the school year after Year 1 of implementation. An independent-samples *t* test was carried out to analyze these data (Laerd, 2018).

The collection of qualitative data, with a need for supportive quantitative data, drove this mixed methods study. Creswell (2005) defined qualitative research as a type of educational research that contains open-ended questions, dependent on participant viewpoints. He further defined quantitative research as a type of education research in which close-ended questions are given, predetermined approaches are identified, and the outcome is numeric data (Creswell, 2005). In this case, the numeric data consists of academic student achievement data. Mixing the qualitative and quantitative research together collects both qualitative and quantitative data to develop a rationale for the stages of inquiry, to present visual pictures of the procedures of both qualitative and quantitative research (Creswell, 2005). Using a mixed methods research study allowed for the examination of the complex factors surrounding the implementation of the Mastery Learning framework to be described and assessed with end of year data for the Pink Elementary School study.

Instruments, Procedures, and Data Collection

Wyse (2011) stated qualitative research is primarily exploratory research. Qualitative research is used to gain an understanding of underlying reasons, opinions, and motivations. To uncover trends in thought and opinions and dive deeper into the problem, qualitative research is used. Some common methods used for the qualitative research on

Mastery Learning at Pink Elementary School included focus groups and survey data. According to Wyse (2011), the sample size should be small, and respondents are selected to fulfill a given quota for research.

Table 7 describes the research questions in connection to this study. The table goes on to list methods with which data were collected and analyzed that pertain to each research question.

Table 7*Research Questions and Methods to Data Collection and Analysis*

Research questions	Instruments	Data collected	Methods of analysis
How can teacher efforts to specify learning and how it will be evaluated at a site working to implement the Mastery Learning framework be described?	Focus Group Likert Scale Teacher Perception Survey	Focus group questions 1 and 2 Teacher Perception Survey Items 1 and 2.	Qualitative analysis-organized, identified, and coded themes of responses. Descriptive statistics related to Research Question 1 – Likert Scale Frequency distribution
How can teacher efforts to allow students to learn at their own pace at a site working to implement the Mastery Learning framework be described?	Likert Scale Teacher Perception Survey Focus Group	Teacher Perception Survey Item 3 Focus group Questions 4, 5, 8, 9, and 10.	Descriptive statistics related to Research Question 2 – Likert Scale Frequency distribution Qualitative analysis-organized, identified, and coded themes of responses.
How can teacher efforts to assess student progress and provide appropriate feedback or remediation at a site working to implement the Mastery Learning framework be described?	Likert Scale Teacher Perception Survey	Teacher Perception Survey Items 4, 5, 8, 9, and 10.	Descriptive statistics related to Research Question 3 – Likert Scale Frequency distribution

(continued)

Research questions	Instruments	Data collected	Methods of analysis
To what extent are final learning criteria tested and achieved at a site working to implement the Mastery Learning framework?	EOG Scores Independent Samples T-Test	Percentage of students receiving Level 3, 4, or 5	Quantitative Analysis: Gather EOG data from previous year and compare to current EOG data with implementation of Mastery Learning using Independent Samples T-Test. EOG scores are the final learning criteria.
	EOG Growth Scores Comparison of Growth Scores over 2 years	Percentage of students meeting growth as determined by the state	Quantitative Analysis: Gather EOG Growth data from previous year and compare with current EOG Growth data with implementation of Mastery Learning.
	Likert Scale Teacher Perception Survey	Teacher Perception Survey Items 6 and 7	Descriptive statistics related to Research Question 4 – Likert Scale Frequency distribution
	Focus Group	Focus group Questions 4, 5, 8, 9, and 10.	Qualitative analysis- organized, identified, and coded themes of responses.

Participants at the school were first given an online survey created by me using Survey Monkey. The survey was created to best determine current perceptions of their efforts with the Mastery Learning framework of specifying learning and how it will be evaluated, students learning at their own pace, assessing student progress and providing feedback and remediation, and finally testing final learning criteria to see if they have

been achieved (Appendix A). According to McLeod (2008), there are advantages to Likert scale survey items. These advantages include the fact that they do not expect a simple yes/no answer from the respondent but rather allow for degrees of opinion or even no opinion at all, and the data can be analyzed with relative ease. However, like all surveys, the validity of Likert scale attitude measurement can be compromised due to social desirability. Individuals may lie to put themselves in a positive light. For this study, the participants were assured of anonymity on the self-administered questionnaire to further reduce social pressure and thus reduce social desirability bias. Items on the survey were designed very carefully in order to elicit honest responses. The survey begins asking about teacher experiences with Mastery Learning prior to the 2017 school year. It then logically moves into questions about the school's professional development. The survey concludes with questions about teacher current beliefs and practices through Mastery Learning.

According to Iarossi (2006), field-testing is a critical part of the process in the creation of a survey. This survey was first field-tested at another elementary school that was in the implementation process of Mastery Learning. Ten participating third-, fourth-, and fifth-grade teachers filled out this survey from the school. Field-testing this survey allowed the survey developer to gain information about the survey. This is how the time necessary to take the survey was determined as well as the evaluation of the clarity of the questions being asked. From the test audience, I was able to determine if the respondents understood the objectives of the survey and if essential issues related to the survey were overlooked. The survey was minimally modified based upon the feedback gained from the field test. The survey remained anonymous. I was also able to authenticate the survey

items through this process.

In the same way, to dive deeper in an understanding of Mastery Learning at Pink Elementary School, I conducted a focus group. A focus group is a method of qualitative research because it asks participants for open responses conveying their thoughts or feelings. According to Quain (2019), researchers seek more open and complete perspectives through focus groups as a part of qualitative research. I planned a focus group to gain additional insight on how the third-, fourth-, and fifth-grade teachers perceived the Mastery Learning framework implementation and the impact at Pink Elementary School.

I was the moderator for the focus group. Derived from the teacher perception survey responses (Appendix A), I posed a series of questions (Appendix B) in order to gain insight about how the teachers of the group viewed the Mastery Learning framework as they worked to implement it in their classrooms. I posed the questions in a way (Appendix C) that did not lead the participants to provide a desired response but rather open, honest, and insightful responses. Quain (2019) also stated that focus groups are more useful when the researcher is looking for more open feedback, rather than comparisons of potential results as in a quantified research method. No incentive was offered to the participants of this focus group.

Qualitative Data Analysis

Preceding the necessary research, teachers at Pink Elementary School received an email where their role in the study was explained. The specifics regarding the overarching plan for conducting research, the permission to opt out of the study at any time, and confidentiality were explained in this informed consent document. As

recommended by Sieber (1992), individual responses may be described in research reports; however, all possible precautions were taken to disguise individual identities so readers of the report are unable to link them to the study.

To measure success of the participating teachers of the study with regard to prioritization and organization of objectives as well as communication and evaluation of those objectives, I planned to conduct observations and utilize an evaluation tool to conduct those observations. The observation evaluation tool would have allowed me to know if the teachers being studied are succeeding with regard to prioritizing and organizing of objectives during a lesson. However, due to site changes after proposal, I was not a part of the staff at the new site, thus limiting the data that could be collected. As such, observations could not be conducted. In addition, I planned to attend PLC meetings of the grade-level teachers participating in the study. My attendance in PLC meetings would have allowed assessment and observations of teacher practices in establishing and prioritizing instructional objectives and organizing the objectives into instructional units based on rational considerations (priority to objectives), failure to properly orient the students to Mastery Learning programs, and failure to make rational, justifiable decisions about performance standards. Once again, when my site changed after the proposal, I was no longer able to attend PLC meetings at the new site, limiting data collection.

In order to measure properties, characteristics, and variations that are not directly observable, items were determined for a survey. Survey items were based strictly on the research questions in order to fulfill the necessary research needs for this study. To yield useful and meaningful results, each individual question assisted in answering each

research question. To keep a strong focus, the survey created consisted of 10 questions. According to Couper (2008), the length of a survey should be short enough that it takes the average user 5 minutes or less to complete, which can usually be achieved with about 10 questions or less.

Teachers were given the survey through Survey Monkey and were given 1 week to complete this survey. I sent one reminder email out 2 days before the survey was due. As surveys from Pink Elementary School were completed, I took the responses and analyzed them. I utilized the Likert scale analysis on Survey Monkey to analyze, identify, and finally, find trends. A Likert scale is a common way to get feedback on how strongly people feel about a topic, in this study, Mastery Learning. The Likert scale centers around a neutral option to uncover the different degrees of opinion participants have.

Upon completion of the survey, to obtain more open and complete perspectives, a focus group was held consisting of four teachers. Third-, fourth-, and fifth-grade teachers participated in the focus group facilitated by me. The focus group was selected based on agreed participation. Teachers had the opportunity to come to the focus group if they chose to do so. Questions for the focus group were based on survey responses and were created with the intent of collecting more data from survey items. Questions were asked in an interactive group setting where participants were free to talk with other group members, which is imperative to the methodology of a focus group (Appendices B, C).

Conversations from the focus group meeting were recorded and transcribed to ensure the storage of quality data. From the recordings, I analyzed the responses and then coded them. An independent researcher was also used to validate the coding process. The independent researcher selected was a current administrator at an elementary school in a

different county than the county where the research was conducted to reduce bias. This administrator has experience with Mastery Learning and qualitative coding methods. The outside researcher independently read teacher responses to surveys, recording themes to determine if the themes that were identified by me previously were accurate.

Pope and Mays (2006) noted that qualitative methods, using narrative rather than numerical data, can be seen to “reach the parts other methods cannot reach” (p. 43). Qualitative research is particularly good at answering the “why,” “what,” or “how” questions, such as the ones included in this research study. To begin the process of culling through the data from the focus group, I noted and recorded information noticed as the data were collected and sorted. The mass of words to be gained by focus group data was described and summarized by me. The focus group responses required me to seek relationships between various themes that were identified. Derived from the data were thoughts of implications for practice or interpretation. Qualitative research is an interpretative and subjective exercise, and I am intimately involved in the process, not aloof from it (Pope & Mays 2006). Tabachnick and Fidell (2007) explained, “Analysis of data is a process of inspecting, cleaning, transforming, and modeling data with the goal of discovering useful information, suggesting conclusions, and supporting decision-making” (p. 33). I looked for patterns or categories that could be transformed in a meaningful way. Through the process of coding, I was able to solidify the ideas that were presented. Hay (2005) recommended a two-step process beginning with basic coding in order to distinguish overall themes, followed by a more in-depth, interpretive code in which trends are more specific and patterns can be interpreted.

From the focus group response analysis came themes. According to Pope and

Mays (2006), a theme is generated when the researcher clusters topics or words into a single category or cluster or brings similar issues and ideas expressed by participants within qualitative data together. This “theme” may be labeled by a word or expression taken directly from the data or by one created by the researcher because it seems to best characterize the essence of what is being said. As conclusions were being drawn and interpretations were made, participants were asked to cross check my findings.

Participants were asked to elaborate on their focus group answers. In this way, I was able to cross check the answers from the focus group questions to determine if the answers from the focus group led to similar conclusions drawn and interpretations made by me. This process was a test of the reliability of the conclusions and themes. In addition, it allowed me to validate the clarity of the questions.

The use of multi-modal techniques triangulated the data in order to gain a more extensive understanding of the degree of teacher efforts to specify learning and how it will be evaluated, teacher efforts to allow students to learn at their own pace, teacher efforts to assess student progress and provide appropriate feedback and/or remediation, and the extent final learning criteria were tested and achieved at Pink Elementary School.

Quantitative Data Analysis

Babbie (2010) defined quantitative methods as the gathering of numerical data and generalizing across groups of people to explain a particular phenomenon. The goal of conducting the quantitative component of this research study was to determine the relationship between Mastery Learning framework implementation and EOG achievement and growth scores within the population of Pink Elementary School students in third, fourth, and fifth grades. The statistical part of this study establishes associations

between the variables (Mastery Learning and EOG achievement and growth scores). All aspects of this study were carefully designed before the data were collected. The quantitative data were organized in tables to make the numerical data easier to read. The overarching aim of this quantitative piece of this study was to construct a statistical model in an attempt to explain what is observed (Babbie, 2010).

To turn raw numbers into meaningful data through the application of rational and critical thinking, a quantitative data analysis occurred. In order to best answer to what extent final learning criteria were tested and achieved at Pink Elementary School, the quantitative approach was carried out. According to Laerd (2012), a quantitative approach is usually associated with finding evidence to either support or reject hypotheses formulated at early stages of the research process. To examine EOG achievement and growth data, over 2 years, analytical software was used to assist with the analysis. Statistical Package for Social Sciences (SPSS) was the analytical software chosen by me. In order to choose the correct statistical test, I created an SPSS account and began to enter the information. Questions about the number of independent (predictor) and dependent (outcome variables) were answered first. One independent variable and two independent groups were chosen. The variables were first chosen and SPSS guided me to the independent-samples t test.

According to Laerd (2018), an independent-samples t test is used when you want to compare the means of a normally distributed dependent variable for two independent groups. For this research study, the mean for EOG achievement and growth was studied for 2 years, before and after Mastery Learning implementation. Laerd went on to explain that the results from an independent-samples t test will show the statistical difference

between the mean scores of the two independent groups and determine whether it is significant. Information from this analysis was presented in mean and standard deviation. The number of participants is also included, in addition to the effect sizes.

Delimitations

I only studied the implementation of Mastery Learning and its effects at this particular school. Teacher availability to attend focus groups was an additional delimitation, as it resulted in a negative response for data collection. Researcher experience in leading a focus group was also a delimitation. Further, other instructional reading and math strategies and methods that may have influenced teachers and students were not studied. An additional delimitation is my inability to observe teachers in their PLCs collaborating and holding discussions about Mastery Learning and implementation of the framework in their classrooms. These ideas were part of my original research and could not be carried out due to site changes and scheduling conflicts.

Limitations

The findings from this research study are only applicable to the particular school studied and no generalizations can be made in regard to the wider educational community. Additionally, it is necessary to note that all the teachers at Pink Elementary School are implementing the Mastery Learning framework. However, I chose to request participation from third-, fourth-, and fifth-grade teachers and their data only. Although kindergarten, first-, and second-grade teachers also have final learning criteria, I determined EOGs, as a standardized measure, would be a reliable, valid assessment to measure final learning criteria. It is also important to note that all the data with regard to implementation are based on teacher reporting of practices with no additional data to

support teacher claims. This mixed methods study includes specific steps to maximize the internal validity. Furthermore, it is necessary to take into consideration the possibility of researcher bias due to the nature of the qualitative research methodology. To counter this bias, I utilized an independent researcher to validate the coding process. This study can only report teacher perceptions of their implementation because there were no observations or collection of materials.

Summary

Many of Pink Elementary School students are proficient readers, especially third-, fourth-, and fifth-grade students, as shown by their EOG test scores. However, the school fell in the “growth not met” category in the 2016-2017 school year. The school adopted the Mastery Learning framework to address this issue in the 2017-2018 school year with an emphasis on the impact of the framework on teachers, students, and achievement. Teachers were provided with training and professional development on Mastery Learning and its framework. This change affected every teacher and student at the school. The purpose of this study was to examine the degree to which teacher efforts implementing key components of the Mastery Learning framework impacted EOG test scores and growth scores at Pink Elementary School through clearly specifying what is to be learned and how it will be evaluated, allowing students to learn at their own pace, assessing student progress and providing feedback/remediation, and testing that final criteria have been achieved (Block, 1971).

Chapter 4: Results

The purpose of this study was to examine the broad impact of the implementation of the Mastery Learning framework at Pink Elementary School with regard to implementation of the four elements of the framework and the impact on student achievement and growth at Pink Elementary School.

Background

Pink Elementary School was in search of a new framework to implement. At the conclusion of the 2016-2017 school year, the school had not met their expected growth projection as determined by the state, despite students being proficient in reading, math, and science in third, fourth and fifth grades based on EOG test scores. Pink Elementary School administration searched for a new framework to implement to close the growth and achievement gaps. The site selected Mastery Learning after completing research on this instructional set of practices that spans over decades. Mastery Learning, founded by Bloom (1981), maintained that students must achieve a level of mastery in prerequisite knowledge before moving forward to learn subsequent information. If a student does not achieve mastery on the test, they are given additional remediation, retaught the information, and then tested again. This cycle continues until the learner accomplishes mastery, and they may then move on to the next stage. The Mastery Learning framework was first implemented at Pink Elementary School in 2017. Mastery Learning was selected to emphasize small group instruction and to ensure the students were mastering standards before moving on to the next level. In addition, Mastery Learning was implemented in order to provide students with feedback so they know where they stand academically so they are able to set their own goals.

To support implementation of this new framework in 2017, the school provided professional development on the four key elements of Mastery Learning, as defined by Bloom (1981)/Block (1971): (a) clearly specifying what is to be learned and how it will be evaluated, (b) allowing students to learn at their own pace, (c) assessing student progress and providing appropriate feedback or remediation, and (d) testing that final learning criteria have been achieved (Block, 1971). The implementation of Mastery Learning required a school-wide mindset shift. Every teacher, kindergarten through fifth grade, was trained on the new framework. The professional development began in August 2017 with a preview of the framework and emphasized the change in focus from simply proficiency to growing and moving students to a higher level of learning through feedback and remediation.

In addition, teachers were instructed on the use of strategies to help students increase learning at their own pace. One strategy presented was the use of personalized learning. Teachers were instructed to move from a teacher-centered classroom to a student-centered classroom where students tracked and monitored their learning while the teacher acted as a facilitator. Students were to keep individual data folders where they recorded standards they were working on and what step they were working on for this process. Scores from assessments were tracked on data charts, logs, and graphs. Additionally, teachers were told to keep a record of which students they had involved in small group lessons and conferences, to ensure the teacher had worked with all students multiple times during each week. Due to site changes, I was not able to utilize the small group lesson plans and conference notes used by teachers.

Teachers were informed these changes in implementation would begin as the new

2017-2018 school year started. The administrators monitored the use of the Mastery Learning framework at the site through teacher observations, professional development offered, and monitoring PLC meetings.

At Pink Elementary, the initial Mastery Learning framework training was followed up by periodic professional development throughout the school year. At each of the new professional development times, different aspects of the framework were explained and highlighted. Explanations were clarified and teachers were shown how to use a variety of strategies associated with the framework. In addition, data from Mastery Learning was kept so reports could be created and teachers could use the data more efficiently to drive their instruction. I had hoped to utilize the data from Mastery Learning kept by the teachers; but due to site changes, the scope was limited.

Explanation of the Study

The comprehensive change associated with the “growth not met” ranking from EOG scores brought about the implementation of a new framework. Practices of Mastery Learning were introduced to Pink Elementary School in the fall of 2017. This change affected every student, teacher, and parent at Pink Elementary School. In order to more completely explore this change and the implementation benefits and challenges, a mixed methods study was conducted. Individual responses from 10 of the 14 teachers who were invited to participate in an initial online teacher survey were first analyzed by a Likert scale, looking for perceptions pertaining to the implementation of Mastery Learning at Pink Elementary School. Next, I invited the participants of the study to be a part of the focus group. Six of the 14 teachers invited to participate volunteered to be a part of the focus group. The survey group items were based on responses of the teacher perception

survey and aligned to Mastery Learning components and the research questions. The focus group questions and conversations were recorded and then analyzed for common themes and coded. I revisited the collected data several times, combining and changing codes as deemed necessary, and an outside researcher was used to validate the identified themes. All data were revisited many times in the recurring nature of the study methodology. To further triangulate the data, EOG achievement and growth scores for the end of the 2018 year were examined and compared to EOG achievement and growth scores for the end of the 2017 year, which revealed after 1 year of implementation, the growth had increased for the school as a whole. The data from the survey, focus group data, and EOG data related to Mastery Learning are discussed in this chapter. The findings from this mixed methods study are presented in this chapter, which is organized into broad categories that loosely follow the research question topics.

History and Design

In order to gain more specific understanding of past and current Mastery Learning framework implementation as they related to the implementation at Pink Elementary School, a question dealing with this issue was asked as part of the focus group.

Six of the 14 third-, fourth-, and fifth-grade teachers at Pink Elementary School were a part of the focus group. However, 10 teachers responded to the survey. The survey responses were anonymous. During the focus group, the question was asked, “Describe the way you used Mastery Learning in your classroom prior to this school year.” Table 8 summarizes the identified themes and the number of responses coded per theme.

Table 8

Past Mastery Learning Practices: Number of Coded Responses Per Theme

Track assessment grades	Small groups	Not used
2	3	1

Two of the six teachers initially indicated they were only tracking assessment grades prior to the 2017-2018 school year. One teacher stated, “Last year I used a Mastery Tracker primarily to track mastery in math not as much in reading.” Another teacher noted, “To scan data from assessments.” These responses indicated that although teachers knew parts of the framework of Mastery Learning, the framework in its entirety was not implemented with fidelity prior to the 2017 school year.

Likewise, three teachers admitted that they did not use the Mastery Learning framework extensively prior to the 2017 school year. One participant stated, “To guide whole group instruction.” Another teacher stated, “To review skills.” The third teacher explained, “The same way as last year but a little more in depth with a focus on bubble kids.” Bubble kids are those who do not achieve mastery, missing achievement by only one or two points. These responses from the survey underscored the diverse role teachers played during classroom instruction concerning Mastery Learning in their individual classrooms before the 2017-2018 school year and the lack of continuity in practices of Mastery Learning at Pink Elementary School.

Highlighting the overall lack of consistency in teacher practices and beliefs prior to the 2017-2018 school year, one teacher had not used this framework or heard of it at all. This teacher was new to teaching and explained, “I had never heard of Mastery Learning before this year, I did not learn about it in college.”

From the focus group results, it was apparent that although some teachers knew parts of the Mastery Learning framework, Pink Elementary School teachers had differences in implementation and use of the parts of the framework in their individual classrooms. Some teachers tracked data, some did large group instruction, and another teacher had never heard of the framework prior to this school year.

As part of the school-wide initiative to implement the Mastery Learning framework, teachers at Pink Elementary School were trained in each piece of the framework at the beginning of the 2017-2018 school year. To determine the extent to which teachers were following the recommended framework, the teachers were asked deeper questions.

Specifying What Is to Be Learned and How It Will Be Evaluated

To determine the extent to which teachers were following recommended practices, teachers who participated in the teacher perception survey were given the following statement, “I specify learning and how it will be evaluated as it relates to Mastery Learning in my classroom.” The survey data are listed in Table 9.

Table 9

Specifying Learning and Evaluation Percent of Responses

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
33.33%	33.33%	33.33%	0%	0%

Data from the teacher perspective survey revealed 66.66% of teachers agree or strongly agree that they are specifying learning and how it will be evaluated. It is evident that more than half of the group was consistent with this step of the Mastery Learning framework.

Participants in the focus group were asked to describe the process of specifying learning and how it will be evaluated as it related to Mastery Learning in their classroom. Table 10 summarizes the two identified themes that emerged and the number of responses coded per theme.

Table 10

Specifying Learning and How It Will Be Evaluated: Number of Coded Responses Per Theme

Create learning targets	Teach to test
4	2

Information summarized in Table 10 indicates that one emerging theme was the creation of learning targets or learning goals to specify learning and how it will be evaluated in classrooms. One teacher stated, “These are the tools for what we will teach. We begin by creating learning targets that we want our students to master by the end of our lesson.” In addition, another teacher stated, “I create learning goals for my lessons as I create my lesson plans. These are what I want my students to be able to say and do each day during my lesson.” Echoing, the third teacher said, “To ensure that I know what to teach, I specify what I need my students to learn and how it will be tested.” Finally, the last teacher agreed and explained, “I feel that I clearly identify what needs to be taught and how I plan to assess the students on what is taught.” Data showed that 66% of teachers who participated in the focus group used learning targets to specify what is to be learned and how it will be evaluated as it relates to Mastery Learning in their classrooms.

Two teachers responded to the focus group question, “Describe the process of specifying learning and how it will be evaluated as it relates to Mastery Learning.” Their

responses were coded with the theme Teach to the Test. One teacher explained, “I use reverse teaching to teach to the test. The test is my final evaluation.” The other teacher who fell under this theme also stated, “I use backwards planning to teach and make sure my students know what will be on their test.”

The data signified that 66% of the Pink Elementary teachers who participated in this study perceived specifying learning and how it will be evaluated as learning targets and planning learning goals for each lesson. Further, 34% of Pink Elementary School teachers perceived specifying learning and how it will be evaluated as backwards planning or teaching to the test. According to the assistant principal, the use of PLC meetings and grade-level planning meetings had become intentional and consistent by both the teachers themselves and the administration at Pink Elementary School.

Students Learning at Their Own Pace

Personalized learning, or students learning at their own pace, had been used at Pink Elementary School since 2016. Some teachers had implemented personalized learning in 2016 for student buy-in and to improve student engagement as students have more control of their learning. In order to determine teacher perception of the changes that had taken place with Mastery Learning implementation and to assess if their students are really learning at their own pace, I studied the past practices and current beliefs of the teachers who used the Mastery Learning Framework at Pink Elementary.

The teacher perception survey asked teachers about their belief that the Mastery Learning Framework allows students in their class to learn at their own pace. Table 11 shows teacher perceptions of students learning at their own pace in individual classrooms.

Table 11

Students Learn at Their Own Pace Percent of Responses

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
0%	40%	60%	0%	0%

Table 11 data reveals that 40% of the teachers agreed that they allowed students to learn at their own pace in their individual classrooms. Conversely, 60% of teachers said that they neither agree nor disagree that they allow students to learn at their own pace in their classrooms.

In the focus group, teachers were asked to elaborate on identified themes. The question, “Do you believe that the Mastery Learning framework allows students to learn at their own pace? Explain,” was asked to the group. Teachers mentioned the words buy-in and growth. One teacher explained it this way, “Students are motivated to learn independently by seeing their growth.” Another teacher’s comments expanded on this sentiment: “Towards the middle of the year the students really bought into it and were eager to learn at their own pace and see their individual growth through their individual data tracker.” Another teacher went to explain, “Somewhat, students do like individual immediate feedback.” A fourth teacher went on to clarify her perception: “Having students track their own data and using individual successes to work together for a class party allowed each of my students to learn at their own pace.”

According to Nannini (2012), utilizing a data tracker leverages paper-based tracking tools of various forms to empower students to both self-direct their learning and to set goals and monitor progress towards completion. Students can utilize an overall tracker used to monitor progress through all standards-based playlists throughout a

semester or a playlist tracker used to monitor progress throughout an individual playlist, indicating completion of activities and student-reported mastery on various checks for understanding. On each tracker, students are able to record their scores from multiple forms of checks for understanding. These may include but are not limited to exit tickets, activities measuring mastery, and mark-completed assignments. Students at Pink Elementary used these data trackers to become self-directed learners. In addition, aggregating student data onto paper trackers allows teachers to easily and quickly review each student's progress and provide feedback/support as necessary.

The overwhelming perception of teachers that students being in charge of their learning and utilizing data tracking was a critical point for celebration, specifically in regard to students learning at their own pace. In addition, the previous perceptions of teachers also demonstrated their lack of understanding of recommended implementation practices of the framework, which has now cleared up.

Assessing Student Progress and Providing Feedback and Remediation

In order to gain a deeper understanding of the assessment of student progress and providing feedback or remediation at Pink Elementary School, the teacher perception survey asked, "I believe assessing student progress and providing feedback and remediation are an important part of each learning opportunity." While a majority agreed in their responses, there were a couple teachers who did not agree in their responses.

Table 12 summarizes the responses associated with this question.

Table 12

Student Progress Assessed – Feedback and Remediation Are Provided Percent of Responses

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
33.44%	66.67%	0%	0%	0%

Sixty-six point sixty-seven percent of teacher perception survey responses stated that they agree that in their classrooms, the teachers are assessing student progress and providing feedback or remediation. The other 33.33% of teachers who participated in the teacher perception survey stated that they strongly agree that they are assessing student progress and utilizing feedback and remediation to support student learning. It is important to note that although 66.67% of teachers believed feedback and remediation are part of student progress assessed, it cannot be said that teachers are, in fact, providing the feedback and remediation.

Additionally, the teacher perception survey asked teachers about the use of small groups during instruction. “I pull small groups for mastery learning to occur” was a part of the teacher perception survey. Table 13 displays teacher responses to this question.

Table 13

Small Groups are Utilized

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
33.33%	33.33%	33.33%	0%	0%

Thirty-three point thirty-three percent of teachers strongly agreed, agreed, and neither agreed nor disagreed that they utilize small group instruction in their classrooms. The teacher perception survey also included the question, “I put emphasis on small group

work and remediation to achieve mastery.” For this question of the teacher perception survey, 100% of teachers who participated in the survey stated they agreed they put emphasis on their small group work and remediation to achieve mastery. These two questions were similar and elicited different responses from the teachers who participated, leaving me to question the clarity of the survey question.

To continue to study the assessment of student progress and providing feedback or remediation at Pink Elementary School, teachers were asked on the teacher perception survey, “I currently use data from Mastery Learning.” Table 14 summarizes the responses.

Table 14

Data from Mastery Learning Are Utilized

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
33.33%	33.33%	33.33%	0%	0%

Sixty-six point sixty-seven percent of the teachers surveyed in the teacher perception survey indicated that they strongly agree or agree that they utilize data from Mastery Learning in their classrooms. Finally, 33.33% of the teachers surveyed in the teacher perception survey indicated they neither agree nor disagree that they utilize data from Mastery Learning in their classrooms.

To gain a clearer understanding of the assessment of student progress, and providing feedback or remediation at Pink Elementary School, the teacher perception survey asked, “I currently provide feedback for my students.” Table 15 summarizes teacher responses for this question on the teacher perception survey.

Table 15*Feedback Provided*

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
33.33%	66.67%	0%	0%	0%

Teachers showed on the teacher perception survey that 33.33% strongly agree and 66.67% agree that they provide feedback for their students in their classrooms as it relates to Mastery Learning and student growth. One hundred percent of the teachers at least agree that they are providing feedback to the students, which shows that though it may not be happening consistently, the teachers are at a very minimum providing feedback.

Teachers were also questioned through the focus group to elaborate on assessing student progress and feedback given to the students they taught in 2017-2018. The question was asked, “What does assessing student progress and providing feedback and remediation look like in your classroom or grade level?” Table 16 summarizes the themes associated with the responses.

Table 16*Assessing Student Progress and Remediating Students*

Groups	All day, every day
5	1

Five of the six teachers’ responses indicated that the use of assessing student progress and providing feedback and remediation looked like “groups.” One teacher stated, “I look at Mastery Connect data after each checkpoint assessment to create new small groups for instruction and celebrate successes.” Another teacher commented, “I use this data to form small groups.” A third teacher response was, “I use Mastery Learning

for small group centers and assessments.” A fourth teacher explained, “Yes, I use standards that need to be retaught and look closer at data to determine misconceptions and form small groups.” Based on my experiences of incorporating Mastery Learning in a classroom, I interpret these comments on small groups as time where teachers group students based on individual student strengths and weaknesses. Each small group of students will be taught in the designated small group based on data that show the students’ individual needs of remediation in a specific area or enrichment. During small group instruction, teachers are able to provide feedback specific to a student’s individual needs on a smaller scale.

It was clear from the majority of focus group responses that teachers at Pink Elementary assess student progress and provide feedback and remediation through small groups in their classrooms. The shift in teaching the whole class versus teaching students in small groups to meet individual student needs and provide feedback to individual students based on their specific needs was a significant change.

During the focus group, the teachers were also asked to expand on prior use of small group time before Mastery Learning was introduced. Teachers were asked, “Prior to this school year, how much time did you spend pulling small groups for mastery learning to occur? Describe what took place during this time in your classroom.” Table 17 displays the themes of average time per week teachers spent pulling small groups for Mastery Learning to occur.

Table 17

Prior Weekly Small Group Usage

0 times/week	2 times/week	3 times/week	3+ times/week
1	2	2	1

One teacher stated she had never used small groups before this year. Two teachers explained that they utilized small group instruction two times per week before this year. Two other teachers share their students benefitted from small group instruction at least three times a week. Finally, one teacher explained, “I have always pulled small groups for 20 years. It’s what effective teaching is.” This teacher also shared that they pull a math and reading group each day.

Focus group participant comments showed that they also recognized the importance of the entire school utilizing small groups to enrich/reteach. Focus group participants were asked, “How much emphasis do you put on small group work and remediation to achieve mastery? Describe what takes place in your classroom.” Responses continued to echo the themes already identified. “I use it to form small groups and focus on Common Core State Standards that need to be retaught”, stated one teacher. Another teacher explained, “I use reteach in a small group at least once a day in math and once a day in reading.” A third teacher responded, “A lot of emphasis is put into re-teaching and small groups during 45 minutes of intervention block each day.” A fourth teacher stated, “I use small groups about 50% of the instructional day.” The final two teachers added, “I utilize daily small groups for reading and math reteach; I use stations to support this process”; and “I use small groups one to two times a day for about 15 to 20 minutes each time.” Participants seemed to be in agreement for emphasizing small groups in reading and mathematics.

Teachers in the focus group were then asked, “Do you currently use data from Mastery Learning? Explain.” All six teachers answered positively that they currently use data from Mastery Learning. One teacher explained that they use the data from Mastery

Learning, “all day every day”. Another teacher said, “Yes I use this data to form my small groups.” A third teacher explained, “Yes, it helps me target both the specific skills and standards to pinpoint that they students really need.” Another teacher went on to say, “I use Mastery Learning data for small group centers and assessments.” Based on my experiences as a teacher of Mastery Learning, utilizing Mastery Learning data can be described as using assessment data, small group data, exit ticket data, observation data, etc. A fifth-grade teacher agreed, “Yes-daily for groups.” The final teacher explained, “Yes. I look at standards that need to be retaught and look closer at data to determine misconceptions that students may have.” According to the data gathered, the majority of teachers at Pink Elementary School did support the use of data-driven instruction to guide and drive small groups during instruction.

The final question asked to the focus group participants was, “How do you currently provide feedback for your students?” Five of the six responses were coded as tracking data. Table 18 summarizes the results of the focus group question.

Table 18

Methods of Feedback Provided: Number of Coded Responses Per Theme

Data tracker	N/A
5	1

One teacher stated that this was “not applicable” to her classroom. The other responses, however, all had a theme of “data tracking.” One teacher explained, “My students are able to track their percent of mastery for each standard and I am able to give them specific feedback based upon work and data for each standard completed.” Another teacher went further to explain, “I use data to form intervention groups where student

buy-in is present due to individual student data folders and the drive to want to move on to the next deficit after they master the first and get to record it in their data folder.” To further support the method of data trackers used in the classroom, a final teacher added,

I provide feedback through interventions that students have skill deficits in.

Ensuring that all students are able to meet with me and gain insight on where their mistakes or struggles are allows them to grow and their bar in their data folder to get taller and taller!

Testing Final Learning Criteria Has Been Achieved

Teachers were asked during the focus group, “What does testing final learning criteria to see if it has been achieved in your classroom or grade level look like? Explain.” Two themes emerged from their responses. Table 19 summarizes the themes identified from the responses to the question.

Table 19

Testing Final Learning Criteria: Number of Coded Responses Per Theme

EOGs	Formative classroom assessment
3	3

Three of the teachers listed EOG tests as the test for final learning criteria to see if they have been achieved. The other three teachers gave an example of another type for formative classroom assessment given throughout the year.

The online teacher perception survey asked the teachers, “I test final learning criteria to see if they have been achieved in my classroom.” From this question, 100% of the teachers at Pink Elementary School agreed that in some form they test final learning criteria to see if they have been achieved in their classroom.

Another question asked by the online teacher perception survey was, “EOGs are a good data point to see if final learning criteria have been achieved in my classroom.”

Table 20 displays survey responses.

Table 20

Use of EOGs to Determine Final Learning Criteria Percent of Responses

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
0%	33.33%	33.33%	0%	33.33%

The teachers participating in the online teacher perception survey showed that only 33.33% agree that the EOG tests given at the end of the school year are a good data point to use to determine if final learning criteria have been achieved in a classroom.

Finally, teachers who participated in the focus group were asked, “Would you consider EOGs to be a method of measuring final learning criteria? Why or why not?” The themes coded from this question were a simple yes or no and are seen in Table 21.

Table 21

EOGs as a Final Learning Criteria: Number of Coded Responses Per Theme

Yes	No
3	3

Teachers participating in this focus group were torn with their responses. Fifty percent of teachers said yes, EOGs are a method of testing final learning criteria to see if they were achieved. However, the other 50% of the teachers said no, EOGs are not a good method of testing final learning criteria to see if they were achieved. One of the teachers who answered “no” explained that “there is too much testing in third, fourth, and fifth grades and EOGs should not carry that much weight.” Another teacher said “yes.”

That teacher went to explain, “The final learning criteria should be at the end of the year, the final part. The EOG is a great test for this to see if the final learning criteria was achieved. This can be solved in one test.”

Implementation Fidelity

In order to determine the teacher perceptions of the fidelity of implementation, teachers were asked a question in the teacher perception survey. The reports again surfaced as a positive aspect of Mastery Learning. One hundred percent of teachers affirmatively agreed that they used the Mastery Learning framework, or some aspect of Mastery Learning when answering the question, “I use Mastery Learning Framework in my classroom this school year.” The answers on this question of the survey indicated that Pink Elementary teachers perceived an awareness and practice of the Mastery Learning framework. However, it is clear in examining the survey and focus group data that implementation fidelity has not been reached and a deeper examination is necessary.

Effectiveness

In addition to studying teacher perceptions of the implementation of Mastery Learning, I also analyzed data that measured the effectiveness of the framework on students achieving final learning criteria. The first set of data examined was the state EOG data from 2016-2017 which can be seen in Table 22. This provided me with information on Pink Elementary student achievement prior to implementation of Mastery Learning. In order to study this implementation over time, this data are succeeded by data from the following 2 school years, as seen in Table 22.

Table 22*NC School Report Card for EOG Proficiency Comparison*

Year	Reading	Math
2016-2017	76.5%	69.1%
2017-2018	67.5%	70.2%
2018-2019	63.0%	60.3%

The data reported in Table 22 reported that in the 2016-2017 school year, in reading and math, the majority of students at Pink Elementary School were proficient in regard to EOG test scores. However, the data in the table also indicate that in 2017-2018, the majority of the students were still performing at the proficient level with a slight increase in math percentage. In the subject of reading, there was a decline in students who scored at the proficient level. Proficiency scores moved from 76.5% proficiency to 67.5% proficiency. Finally, in the 2017-2018 school year, reading proficiency scores decreased by 4.5% and math proficiency scores decreased by 9.9%.

The independent-samples t test is a procedure that calculates the difference between the observed means in two independent samples. A significance value (p value) and 95% confidence interval of the difference are reported. The p value is the probability of obtaining the observed difference between the samples if the null hypothesis was true. The null hypothesis is the hypothesis that the difference is zero. According to the results of the independent-samples t test, after 1 year of implementation, the 2017-2018 school year, the math achievement had increased to 70.2, a 1.1-point difference increase in math achievement for the school as a whole. The standard error was 0.043. Calculating the 95% confidence interval of the difference, the data calculated obtained 1.0157 to 1.1843 statistically. The confidence interval accounts for how stable the estimate is. A stable

estimate is one that would be close to the same value if the survey were repeated. When comparing the confidence interval of 1.0157 to 1.1843 statistically to the 1.100-point difference in means, the mean estimate proves stable as 1.100 falls between the confidence interval of 17.5432 to 20.4568. The significance level or p value for these data was calculated using the t test, with the area of t distribution with n_1+n_2-2 degrees of freedom that falls outside $\pm t$. When the p value is less than 0.05, the conclusion is that the two means are significantly different (Altman, 1991). The significance level for this growth data was $p < 0.0001$, showing that the two means are significantly different.

Following the independent-samples t test for math achievement scores, another independent-samples t test was calculated for reading achievement scores. According to the results of the independent-samples t test, after 1 year of implementation, the 2017-2018 school year, the reading achievement had decreased to 67.5, a -9.000 point difference increase in reading achievement for the school as a whole. The standard error was 0.351. Calculating the 95% confidence interval of the difference, the data calculated obtained -9.6901 to -8.3099 statistically. The confidence interval accounts for how stable the estimate is. A stable estimate is one that would be close to the same value if the survey were repeated. When comparing the confidence interval of -9.6901 to -8.3099 statistically to the -9.000 point difference in means, the mean estimate proves stable as -9.000 falls between the confidence interval of -9.6901 to -8.3099. The significance level or p value for these data was calculated using the t test, with the area of t distribution with n_1+n_2-2 degrees of freedom that falls outside $\pm t$. When the p value is less than 0.05, the conclusion is that the two means are significantly different (Altman, 1991). The significance level for these growth data was $p < 0.0001$, showing that the two means are

significantly different.

The next set of data examined by me was the state EOG growth data from 2016-2017 which can be seen in Table 23. This provided me with information on Pink Elementary student growth prior to implementation of Mastery Learning. The data outlined in Table 23 show the breakdown of the growth measurement scores in relation to the state.

The Academic Growth Scale for North Carolina Schools (North Carolina School Report Card, 2017) consists of exceeds, met, and not met. To be considered in the category of exceeding expected growth, the growth range for the school must be 85-100. To meet growth as a school, the school must fall in the growth range of 70-84.9. Finally, a school will have the status of growth not met if the school's growth range is between 50-69.9. School performance growth is determined by using the following formula: school performance score = (.8 x achievement score) + (.2 x growth score; North Carolina School Report Card, 2017).

Table 23

Academic Growth History 2015-2019

Year	Growth	Status
2015	84.9	Met growth
2016	82.9	Met growth
2017	57.1	Growth not met
2018	76.7	Met growth
2019	84.3	Met growth

According to Table 23, the NC School Report Card for Pink Elementary School's

growth over 3 years is presented. The school was on a positive trajectory for 2014, 2015, and 2016 for meeting growth as identified by the state of North Carolina. However, in 2017, the school fell under the “not met” category for growth with a score of 57.1. This was when the initial change to the Mastery Learning framework began.

I analyzed the results of the EOG growth data in order to determine if there were any differences in change scores across school years with implementation of Mastery Learning. In this study design, I measured EOG growth scores in school years to know if there is a difference between the groups. I separated the data into different groups based on school year. Sample 1 included 2016-2017 school year growth score data, and Sample 2 included 2017-2018 school year growth score data. According to the results of the data comparison, after 1 year of implementation, the 2017-2018 school year, the growth had increased to 76.7, a 19.7 point difference increase in growth for the school as a whole. Specifically, the results suggest that Mastery Learning had a positive effect on overall school growth. Following the 2017-2018 school year, the growth scores continued to improve. In the 2018-2019 school year, growth had increased to 84.3, a 7.6 point difference for the school as a whole. A possible limitation is that other school-wide initiatives also may have influenced growth.

Summary

At the beginning of the 2017-2018 school year, teachers at Pink Elementary School were given new training on the Mastery Learning framework and its components. This training altered the status quo of the school and resulted in changed instructional practices. Teachers began a school-wide practice of specifying learning and how it would be evaluated into their daily schedules. In addition, the teachers were asked to implement

this framework in a uniform manner through this process. Qualitative data suggest that in the 2017-2018 school year, teachers who participated in the survey and focus group agreed that many common practices in relation to Mastery Learning framework implementation were in place. Quantitative data conclude significant difference in the two growth scores for EOG growth, revealing a positive impact on student growth from the Mastery Learning framework. Math achievement was also positively impacted through the Mastery Learning implementation, according to the independent-samples t test. Reading achievement was an outlier in the independent samples t test calculations. From the 2016-2017 school year to the 2017-2018 school year, Pink Elementary School's mean achievement scores decreased by -9.000.

Based on findings, teacher efforts of specifying learning that were indicated by survey items and focus group responses noted that the site has built strong methods for planning clear learning goals for each lesson. Teacher efforts to allow students to learn at their own pace showed that the teachers were now more confident with attaining student buy-in, tracking student growth, teaching students to track data individually, and felt it was beneficial for students in regard to motivation.

Teacher efforts to assess student progress and provide feedback and remediation as described in the Mastery Learning framework were also studied at Pink Elementary School. Implementation strengths noted during survey items and focus group conversations revealed that student progress is assessed across the site. Findings from the teacher responses revealed that teachers are also working actively to provide feedback to students and use data trackers in some form.

I also studied teacher efforts to test final learning criteria. Findings from the

survey and focus group revealed that teachers agreed that the EOGs are used even though they were not in complete agreement that EOGs are a good measure. The research indicated that through surveys and focus groups, teachers felt there were large amounts of testing in third, fourth, and fifth grades with EOGs in addition to formative classroom assessments.

Furthermore, findings from the teacher responses and EOG data pointed to a high level of implementation in teacher practice in relation to Mastery Learning. An analysis of EOG growth data seemed to suggest that students at Pink Elementary School had made more growth than expected in the 2 succeeding years of implementation.

Chapter 5: Discussion

Introduction

The purpose of this mixed methods study was to examine teacher efforts at Pink Elementary School in implementing the four key elements of the Mastery Learning framework. Specifically, this study examined teacher perceptions of their efforts to implement four components of the Mastery Learning framework including specify learning and its evaluation, teacher efforts at allowing students to learn at their own pace, teacher efforts to assess student progress and provide appropriate feedback or remediation, and the extent to which final learning achievement and criteria are achieved. Qualitative data in the form of surveys and focus groups were examined in order to study the impact of this change. Quantitative data in the form of test scores and growth scores were analyzed in order to study the impact of this change on achievement data. The study was guided by the following research questions:

1. How can teacher efforts to specify learning and how it will be evaluated at a site working to implement the Mastery Learning framework be described?
2. How can teacher efforts to allow students to learn at their own pace at a site working to implement the Mastery Learning framework be described?
3. How can teacher efforts to assess student progress and provide appropriate feedback or remediation at a site working to implement the Mastery Learning framework be described?
4. To what extent are final learning criteria tested and achieved at a site working to implement the Mastery Learning framework?

The research questions were derived from the Mastery Learning framework as

defined by Bloom (1981) and Block (1971). This chapter includes a brief summary of the study, an interpretation and discussion of the findings, and my recommendations for additional research; and to help the reader, the overall summary of the findings can be found in Table 24.

Table 24

Research Questions, Findings, and Recommendations

Research question	Implementation strengths	Implementation areas of improvement	More research needed
How can teacher perceptions of their efforts to specify learning and how it will be evaluated at a site working to implement the Mastery Learning framework be described?	Planning learning goals for each lesson	Intentional and consistent planning/PLC meetings	Examine PLC Minutes and Planning Meeting Agendas
How can teacher perceptions of their efforts to allow students to learn at their own pace at a site working to implement the Mastery Learning framework be described?	Student buy-in, student growth, student motivation, individual data tracking	Self-Directed Learners Students in charge of their own learning	Observe teacher practice
How can teacher perceptions of their efforts to assess student progress and provide appropriate feedback or remediation at a site working to implement the Mastery Learning framework be described?	Student progress assessed, providing feedback to students, data tracker	Small group consistency, utilizing data	Observe teacher practice; Examine feedback Review Small Group Lesson Plans submitted
To what extent are final learning criteria tested and achieved at a site working to implement the Mastery Learning framework?	EOGs used even if all do not agree they are a good measure, they are standard	Too much testing in grades 3, 4, and 5. Formative classroom assessments	What is a good test of final learning criterion? What does research say and how are teachers collaborating in planning and PLC meetings

The findings from Table 24 are organized into categories throughout this chapter, which mirror the themes in both the literature review and the Mastery Learning framework components as defined in the research questions. Recommendations regarding each theme are included in each section.

Summary of the Study

Initial teacher perception data for the study were gathered from the use of an online survey. Ten of 14 third- through fifth-grade teachers at Pink Elementary opted to participate in the online survey. Likert scale items were utilized to collect teacher perception survey data. Emergent themes were noted and questions for focus group sessions were created to examine Mastery Learning framework parts and teacher implementation in more depth. Next, a focus group session was conducted. Six third- through fifth-grade teachers who opted to participate were part of the focus group. After responses were recorded, transcribed, coded, and analyzed, I further triangulated the data. To further triangulate the data, Pink Elementary School EOG test achievement score means from 2016-2017 to 2017-2018 were compared for evidence of reading and math proficiency. Additionally, EOG growth scores were compared from 2016-2017 to 2017-2018 to 2018-2019 for evidence of growth across the school.

Interpretation and Discussion of Results

History and Design

Data associated with this topic indicated that prior to the 2017-2018 school year, the teachers at Pink Elementary School did not have a consistent vision regarding implementing the Mastery Learning framework in the classroom. Levels of knowledge and implementation varied, and there was no school-wide expectation for implementation

of the program. However, Pink Elementary teachers were utilizing the framework and its components more consistently in the 2017-2018 school year, in regard to everyday instructional practices taking place during the allocated schedule. New implementation standards followed by the teachers ensured that teachers taught, assessed, and retaught or enriched in small groups each day. Teachers also reported that they were routinely using the framework. These findings were backed by data from focus group sessions in which Pink Elementary teachers felt there had been a much stronger emphasis placed on meeting the needs of the students as individual learners and students were more motivated during the small group work time than they had been during previous years.

These findings relate directly to the literature on history and design of Mastery Learning as described in the literature. Anderson (1975) noted that Mastery Learning is a set of group-based, individualized teaching and learning strategies based on the premise that students will achieve a high level of understanding in a given domain if they are given enough time. Kulik et al. (1990) found that students fluctuate widely in their learning rates, but that virtually all students learn well when they are provided with the necessary time and appropriate learning conditions. The focus group responses were in line with this research of alignment of learning. One teacher, part of the focus group, echoed, “Students are motivated to learn independently by seeing their growth.” In addition, Bloom (1968b) saw value in organizing the concepts and skills to be learned into units and assessing students learning at the end of each unit as useful instructional techniques. These results paralleled the perceptions of the Pink Elementary School teachers.

In addition to giving students enough time to achieve their goals through

remediation and small group lessons, and driving the lessons by data, the literature further supports the importance of careful and systematic application of the Mastery Learning principles in order to lead to significant improvements in student learning. Implementing the framework with fidelity was commonly reported as a problem at Pink Elementary School prior to the 2017 school year.

It is apparent that the changes in the implementation of Mastery Learning at Pink Elementary School have resulted in a majority of teacher perceptions of positive student engagement and success in math and reading. Teacher roles during Mastery Learning implementation as well as the school-wide time set aside for small groups seem to have had a direct impact on these positive perceptions.

Recommendations

The data show that the new Mastery Learning practices taking place at Pink Elementary School are perceived as beneficial to students. For this reason, I recommend that current Mastery Learning practices be continued at the school. Specifically, the monthly time set aside for professional development of 1 hour on expanding the framework should continue to be followed. Teachers should continue to utilize planning time so it will be apparent if the components of the framework are being followed.

Guskey and Gates (1986) noted in his research that Mastery Learning would not solve all of the complex problems facing educators. However, careful attention to the elements of Mastery Learning allows educators at all levels to make great strides in their efforts to reduce the variation in student achievement, close achievement gaps, and help all children learn excellently. I further recommend that each school year begin with an overview of the elements and framework of Mastery Learning and its purpose in closing

achievement gaps. In this way, all new staff members would also receive training and all classrooms would be able to continue the same level of fidelity with Mastery Learning practices.

In addition, these findings are not able to be generalized, I make the same recommendations for schools in which similar inconsistent implementation needs are found. Specifically, a school-wide professional development appears to be beneficial to teacher implementation of the framework. According to Drago-Severson (2011), one particularly powerful idea from constructive developmental theory is that we, as human beings, make sense of our learning experiences, life experiences, and the world in qualitatively different ways. As adults, teachers have different ways of knowing, which reminds us that we need a variety of pedagogical practices in any professional learning in order to adequately support and challenge adult learners who have different ways of understanding their experiences. First, remembering when attempting to be beneficial to each individual teacher, what feels like a good fit pedagogically for one teacher, might feel overly challenging for another. Paying careful attention to differentiating the structures created for professional development as well as the expectations conveyed in designing the professional development can make a big difference in teacher perceptions of the professional development at Pink Elementary as well as the impact of the professional development to the school in its entirety. Drago-Severson (2011) also explained that feedback is an important part of learning, as is the yearning that most of us have for ongoing support. Supporting teachers at Pink Elementary with intentional professional development and feedback as the site moves forward allows educators at all levels to make great strides in their efforts to reduce the variation in student achievement,

close achievement gaps, and help all children learn excellently.

Specifying What Is to Be Learned and How It Will Be Evaluated

Data from the online survey and focus group pointed to a marked change in teacher perceptions of the Mastery Learning framework components of aligning teaching and assessment so all children can learn during the 2017-2018 school year. Teachers reported feeling they were only tracking grades prior to the 2017-2018 school year. Since implementation, teachers reported they have been creating learning targets or goals for the students they teach as they are specifying learning and how it will be evaluated in their classrooms. Overall, the teachers at Pink Elementary felt favorably about the level of evaluation of students taking place and the ability to clearly identify what needs to be taught and clearly assess the students on what has been taught.

In addition, the way teachers utilized assessments and student evaluations and interpreted them to move forward with instruction drove student motivation. In the school years prior to 2017-2018, teachers used assessment data to determine a letter grade for students to move forward. However, in the 2017-2018 school year, teachers used student achievement data on assessments to create small groups to drive instruction.

Gathered data from Pink Elementary School indicated that the teachers also believed that shifting the focus from teaching to the test was one factor responsible for the ability to specify what is to be learned. There are several researched negative consequences of teaching to the test. In 2016, Hani Morgan, associate professor of education at the University of Southern Mississippi, found that learning based on memorization and recall may improve student achievement on tests, but this type of learning fails to develop higher level thinking skills (West, 2020). Additionally, teaching

to the test often prioritizes linguistic and mathematical intelligences at the expense of an education that fosters creative, research, and public speaking skills. Teachers additionally noted that using learning goals and targets allowed them to become more involved with what their students were actually learning and that teachers seemed to be more knowledgeable of standards to be taught from this type of planning.

The literature on aligning teaching and assessment so all children can learn corroborates the findings from this study. Teachers noted their changed use of lesson planning and assessments from whole class to small group instruction helped meet the needs of individual students. Gentile and Lailey (2003) stated that a wholesome curriculum will spiral around the great ideas, principles, and values of a field. The overarching goal is to assure the mastery of fundamental skills by systematic testing. Planning lessons, aligning teaching to standards, and assessing students to see if they have mastered the standards before moving on to a new standard aligns with Gentile and Lailey's research.

Data gathered from the focus group also revealed that teachers believed specifying learning allowed them to feel more prepared for teaching each day. Brookfield and Preskill (1999) reported success stems from this belief. The prioritizing and organizing of objectives as well as communication of these objectives by mastery should be considered with course objectives and values as a teacher. Teachers may have felt more in control of their teaching when they were teaching the whole class the same thing at one time, instead of based on a specific level; but that is not meeting the needs of individual students in the classroom. Examining the teacher perception data gathered and additional recommendations that were concluded by the researcher which identified

additional data sources for each question to triangulate and validate findings, revealed the data are flawed in terms of a lack of triangulation, so all my findings are tentative.

In addition, fostering the practice of teachers establishing prioritized instructional objectives into instructional units based on rational considerations, as opposed to prioritizing methods of instructional objectives that may have been associated with the growth the students showed on the EOG test, was perceived as another positive change at Pink Elementary.

Recommendations

I recommend Pink Elementary School continue its practice of fostering teachers to establish instructional objectives in order to prioritize what needs to be taught and assessed based on the framework of Mastery Learning, current research (West, 2020), and priority of avoiding teaching to the test. Likewise, I recommend teachers continue to plan with the purpose of increasing student mastery of performance standards. The only data gathered were teacher perceptions, and additional recommendations relate to identifying additional data sources to triangulate and validate findings. I also recommend the use of PLC minutes as well as PLC/planning meeting agendas to provide more of a scope in research for this site with regard to intentional and consistent planning for specifying learning. Finally, fostering the practice of teachers establishing prioritized instructional objectives into instructional units has been perceived as beneficial to teachers and students at Pink Elementary. For this reason, I further recommend that teachers attend professional development on instructional objective creation and the roles the mastery of fundamental skills by systematic testing play in that theory, so this knowledge can be transferred to other aspects of learning at Pink Elementary School.

According to Callahan and Meixner (2020), recommendations for well-designed tests include but are not limited to including required skills or desired level of cognition based on the educational objectives for the assessment, prioritize predetermined goals and objectives throughout the test composition progress, draw from a variety of testing methods or styles to include several kinds of questions, and measure a range of cognitive skills.

Students Learning at Their Own Pace

Data from the online survey and the focus group pointed to a change in teacher perception of students learning at their own pace during the 2016-2017 school year. However, during the 2017-2018 school year, teachers indicated that the use of the Mastery Learning framework encouraged students to learn at their own pace. Teachers also reported that the students had been motivated to learn independently by seeing their growth. Overall, the teachers at Pink Elementary School perceived the new Mastery Learning implementation as having a positive effect on student ability to learn at their own pace.

In addition, the way students are able to track their own data and find individual success may have had a positive effect on students learning at their own pace. In the past, teachers had a diverse group of students in their classroom; and though the teacher recognized the differences, the teacher taught the same thing to all the students in the classroom. The unique needs and abilities of students were not taken into consideration. However, in the 2017-2018 school year, teachers at Pink Elementary School attempted to reach all of their students by giving the Mastery Learning framework a try and providing an experience for each student through changing up the material by student need so every

student is afforded the opportunity of learning, receiving remediation, or enrichment at their own pace. Individualized, self-paced instruction was used focusing on the needs of an individual student.

The literature on students learning at their own pace corroborates the findings from this study. Teachers noted their changed use of students learning at their own pace with the students. Osewalt (2014) stated that students benefit from classification of specific teaching with learning targets introduced one need at a time for individual students. Osewalt continued explaining that students benefit from teachers helping them learn and understand, while other students may skip topics they already know and go on to more advanced information.

Data gathered from the focus group also revealed that teachers believed that pulling groups was a significant part of students learning at their own pace. Flexible or small groups are other aspects of the Mastery Learning framework. Heathers (1977) stated that instructional delivery could give more or less attention to the students' most effective or preferred ways of learning through concrete or abstract approaches, working in groups or working alone, and other expressions of learning styles. The body of literature supports this belief. Bloom (1968b) reported that there are many alternative strategies for learning for mastery. Each strategy must find some way of dealing with individual differences in learners through some means of relating the instruction to the needs and characteristics of the learners. Today, Mastery Learning can impact all areas of a student's classroom experience, not just academics. When students are given time to learn and succeed, they are more likely to value perseverance, have confidence in their skills, and understand their own learning needs (Kampen, 2019).

Recommendations

I recommend that Pink Elementary School continue its practice of allowing students to learn at their own pace in order to foster motivation and growth. Likewise, I recommend that teachers continue holding small groups with the purpose of meeting students' individual needs of remediation or enrichment, intentionally using data to drive instruction of these small groups to further grow reading and math EOG achievement scores. Finally, I recommend the site conduct observations of teachers to observe the students in the classroom as they are learning to become self-directed learners, building motivation, and learning to track their individual data in order to best support individual teachers moving forward.

Assessing Student Progress, Providing Feedback, and Remediation

Data from this study indicated that prior to the 2017-2018 school year, most teachers at Pink Elementary School agreed that they utilized feedback and remediation in their classrooms. Despite this perception, some teachers were still unsure about the impact the Mastery Learning framework would have on the EOG test scores.

An examination of the teacher perception data indicated that Pink Elementary teachers had increased their use of assessment of student progress, providing feedback and remediation over the course of the school year. In September 2017, 100% of teachers who participated in the survey agreed that they put emphasis on their small group work and remediation to achieve mastery in their students. By May 2018, teachers described diving deeper into data analysis and creating assessments to form new groups and celebrate success of the individual students. In addition, teachers stated they were also analyzing standards that needed to be retaught and reassessed to determine

misconceptions and form new small groups.

Assessing student progress, providing feedback, and remediation are all practices supported by the literature. Darling-Hammond (2015) reported on assessment and important aspects of testing. Among the recommended practices were educational assessment and representation. Sound assessment represents a commitment to high academic standards and school accountability. Darling-Hammond reiterated, “You cannot know where you’re going unless you know where you are” (p. 1). Teachers at Pink Elementary School clearly explained to the students that the Mastery Learning framework would consist of assessing their progress.

Providing feedback and remediation is supported by the literature. Bloom (1971) observed that learning checks are more valuable when used in conjunction with the teaching and learning process to provide feedback on students’ individual learning difficulties and then prescribing specific remediation activities. Teachers at Pink Elementary School clearly explained that they provide feedback to their students to support student learning. Understood (2014) reported that remediation as it is related to Mastery Learning is designed to close the gap between what a student knows and what they are expected to know. Teachers at Pink Elementary School explained to students how to track their percent of mastery for each standard and provided specific feedback and remediation based on work and data for each standard completed through individual data trackers.

Recommendations

The Mastery Learning framework allows teachers to gather a multitude of data on the class and individual students. In focus groups, teachers voiced their usage and success

of providing feedback and remediation, analyzing student progress, and utilizing individual data trackers within the Mastery Learning framework. Teachers at Pink Elementary reported using the data to drive instruction to a much greater degree in they 2017-2018 school year; however, research suggests that ongoing professional development is important for implementation fidelity. I recommend examining specific examples of feedback from teachers to students. Further research analyzing content and frequency of feedback needs to occur to see if it matches what teachers report and identifies areas of strength and improvement. Killion (2016) explained,

When schools have high-fidelity implementation of the professional development principles of both professional development content and process, teachers have significantly higher frequency of implementation of instructional practices aligned with the reform program than schools that were low in implementation or those that had high levels in one and low levels in another. (p. 57)

Another recommendation to be considered for this specific site is frequent teacher observations to ensure teachers are providing the feedback and remediation that are necessary to ensure student success. According to Waxman (2020), prior to the use of systematic observational methods, research on effective teaching typically consisted of subjective data based on personal and anecdotal accounts of effective teaching. In order to develop a scientific basis for teaching, researchers began to use the more objective and reliable measures of systematic classroom observation. Finally, analyzing small group lesson plans would strengthen the research of assessing student progress at this site.

Classroom teachers commonly use structured lesson plans to orchestrate their teaching as well as share teaching practices with peers and mentors. However,

structured lesson plans can also be used by teachers to analyze, reflect on, and hopefully improve their teaching design, before they deliver it to their students.

(Sampson, 2017, p. 1)

I cannot fully make a statement on the quality of the feedback due to singularly obtaining teacher perceptual data.

Testing Final Learning Criteria

Data from this study indicated that before 2017-2018 school year, teachers at Pink Elementary School had been assessing final learning criteria to see if they have been achieved in their classroom through generic classroom and unit assessments. Teachers participating in the focus group were torn with their responses. Fifty percent of teachers agreed EOGs are a method of testing final learning criteria to see if they were achieved. However, the other 50% of the teachers indicated EOGs are not a good method of testing final learning criteria to see if they were achieved. One of the teachers who answered “no” explained that “there is too much testing in third, fourth, and fifth grades, and EOGs should not carry that much weight.” Another teacher said “yes.” That teacher went to explain, “The final learning criteria should be at the end of the year, the final part. The EOG is a great test for this to see if the final learning criteria was achieved. This can be solved in one test.”

Teachers at Pink Elementary School had conflicting feelings of whether the EOGs were a good measure of final learning criteria. Gathered data showed the teachers of Pink Elementary School’s negative feelings of one test carrying that much weight, another test for the students, and stress of this one test. Others reported that they agreed it was a great measurement that final learning criteria had been achieved due to it being standardized

across the state. Quantitative data from this study conclude a significant difference in the two growth scores for EOG growth, revealing a positive impact on student growth from the Mastery Learning framework. Math achievement was also positively impacted through the Mastery Learning implementation, according to the independent-samples *t* test. Reading achievement was an outlier in the independent-samples *t* test calculations. From the 2016-2017 school year to the 2017-2018 school year, Pink Elementary School's achievement scores had a decrease in means of -9.000.

The research on testing final learning criteria achievement suggests that Mastery Learning has a positive influence on student test scores and grade point averages (Whiting et al., 1995). In addition, literature by Anderson et al. (1992) stated the implementation of Mastery Learning led to significantly positive increases in academic achievement and their self-confidence. NCDPI concludes that the North Carolina EOG tests are designed to measure student performance on the goals, objectives, and grade-level competencies specified in the North Carolina Standard Course of Study. Further, NCDPI explains North Carolina educators are recruited and trained to write new items for the EOG assessments each year. The diversity among the item writers and their knowledge of the current standards are addressed during recruitment. Trained North Carolina educators also review EOG test items and suggest improvements, if necessary. The use of North Carolina educators to develop and review items strengthens the content validity of the items. I heard the critiques of the EOGs from the teachers during the focus group discussing EOG as a good measure of final learning criteria. The state of North Carolina creates and develops EOGs with test items that are valid and thorough to assess the standards taught in North Carolina public schools. As test developers of EOG and

end-of-course tests, NCDPI has adopted a validation framework consistent with that prescribed in the standards. Under this framework, NCDPI is committed to ongoing evaluation of the quality of its assessments and relevance of their intended uses by continuously collecting and updating validity evidences as new data become available. Linn (2002) noted that serious planning and a great deal of effort are required to accumulate evidences needed to validate the intended uses and interpretations of state assessments. NCDPI recommends prioritizing so the most critical validity questions can be addressed first. NCDPI advocates for validity and reliability to ask, “What are the arguments for and against the intended aims of the test?” In addition, “What does the test do in the system other than what it claims?” For such questions, “it is helpful to consider the level of stakes that are involved in the use or interpretation of results and then give the higher priority to those areas with highest stakes” (Linn, 2002, p. 46).

In addition, data from this study indicated that most teachers perceived the new Mastery Learning framework implementation as having a positive impact on daily student achievement. Despite this perception, some teachers were still unsure about the impact the framework would have in EOG scores.

An examination of EOG scores, summarized in Tables 23 and 24, indicated that Pink Elementary School had increased its growth standard over 1 school year. In the 2016-2017 school year, Pink Elementary School had not met growth. In the 2017-2018 school year, Pink Elementary School met its growth projection as identified by the state.

Interestingly, from the independent-samples t test, a procedure that calculates the difference between the observed means in two independent samples, there was a difference in the amount of mean growth in reaching achievement as a school from 2017

to 2018. A significance value (p value) and 95% confidence interval of the difference is reported. The p value is the probability of obtaining the observed difference between the samples if the null hypothesis was true. The null hypothesis is the hypothesis that the difference is zero. According to the results of the independent-samples t test, after 1 year of implementation, the 2017-2018 school year, the math achievement had increased to 70.2, a 1.1-point difference increase in math achievement for the school as a whole. The standard error was 0.043. Calculating the 95% confidence interval of the difference, the data calculated obtained 1.0157 to 1.1843 statistically. The confidence interval accounts for how stable the estimate is. A stable estimate is one that would be close to the same value if the survey were repeated. When comparing the confidence interval of 1.0157 to 1.1843 statistically to the 1.100-point difference in means, the mean estimate proves stable as 1.100 falls between the confidence interval of 17.5432 to 20.4568. The significance level or p value for these data was calculated using the t test, with the area of t distribution with n_1+n_2-2 degrees of freedom, which falls outside $\pm t$. When the p value is less than 0.05, the conclusion is that the two means are significantly different (Altman, 1991). The significance level for these growth data was $p < 0.0001$, showing that the two means are significantly different.

Following the independent-samples t test for math achievement scores, another independent-samples t test was calculated for reading achievement scores. According to the results of the independent-samples t test, after 1 year of implementation, the 2017-2018 school year, the reading achievement had decreased to 67.5, a -9.000 point difference increase in reading achievement for the school as a whole. When the p value is less than 0.05, the conclusion is that the two means are significantly different (Altman,

1991). The significance level for these growth data was $p < 0.0001$, showing that the two means are significantly different.

I also analyzed the results of the EOG growth data in order to determine if there are differences between 2 years of growth and their interventions and to determine if there was any differences in change scores across school years with implementation of Mastery Learning. In this study design, I measured EOG growth scores in different groups' school years, to uncover a difference in the outcome of growth between the groups. I separated the data into different groups based on school year. Sample 1 included 2016-2017 school year growth score data and Sample 2 included 2017-2018 school year growth score data. According to the results of the data comparison, after 1 year of implementation, the 2017-2018 school year, the growth had increased to 76.7, a 19.7-point difference increase in growth for the school as a whole. The growth presented a positive impact from the implementation of Mastery Learning on EOG growth data.

One reason for the success of the majority of students may be in the way the teachers at Pink Elementary School learned how to drive their instructional practices. Teachers explained that prior to the 2017-2018 school year, they did not fully understand the framework of personalizing learning for students to learn at their own pace, nor did they fully understand that testing final learning criteria were achieved. Teachers stated their instructional practices had changed and they were using the data to target students who did not achieve mastery on an assessment.

Data-driven instruction and formative assessment are both practices that are supported by literature. Guskey (2010) reported on important aspects of formative assessment practices. Among the recommended practices were recognizing students who

do well on the assessment but also frequent assessment of student learning progress to check on the effectiveness of intervention strategies. Teachers at Pink Elementary clearly explained to students that the Mastery Learning framework goal was to improve their individual student growth as well as growth as an entire site, which would be considered successful if the growth indicator as determined by the state was moved from not met to met growth.

Bloom (1971) also explained the importance of offering precise, private feedback on student progress toward the learning targets. Pink Elementary teachers noted the importance of meeting with students in small groups and data tracking each day where students utilize a private folder. Students learning at their own pace was another strategy proposed in the implementation of formative assessment. As a result of implementation, students at Pink Elementary were graphing their progress toward individual goals in a private, individualized data tracker where the teacher and student were able to provide feedback and set goals for the student to work towards.

Recommendations

In accordance with accepted research on implementation of Mastery Learning (Anderson et al., 1992), I suggest that additional short, differentiated trainings on the use of Mastery Learning be scheduled for the coming school year. I suggest implementing teams of teachers to research best practices for assessing if final learning criteria have been achieved and coming together as a school to decipher what the common belief is for this specific part of the framework for this specific site. Future research may want to examine other assessments to examine final learning criteria to determine if students should have EOGs and/or other measures of final learning criteria to determine mastery.

The Mastery Learning framework allows teachers to utilize many data points to gather data on school, class, or individual student. In focus groups, some teachers voiced their desire for more training on the ability to use data to drive instruction and meet the needs of individual students. I agree with this suggestion. Although teachers reported using their data to a much greater degree in the 2017-2018 school year, research suggests that ongoing professional development is important for implementation fidelity.

In addition, the achievement data for the 2017-2018 school year suggest that Mastery Learning may be an effective tool to increase reading and math growth and achievement in third, fourth, and fifth grades at Pink Elementary School.

Table 25

NC School Report Card for EOG Proficiency Comparison

Year	Reading	Math
2016-2017	76.5%	69.1%
2017-2018	67.5%	70.2%
2018-2019	69.3%	64.4%

Although teacher perceptions indicate that the Mastery Learning framework is effective in increasing the math achievement across the school, the EOG overall comparison data in Table 25 show the mean growth for reading overall was below the expected levels in 2017-2018 but began to rise in 2018-2019. I recommend carefully studying the reading achievement data over the next year to determine if using the Mastery Learning framework is an effective practice.

Implementation Fidelity

Data from this study indicated that teachers at Pink Elementary School had positive perceptions of the need of fidelity of implementation with the Mastery Learning

framework. Before the 2017-2018 school year, the teachers at Pink Elementary School were not using the Mastery Learning framework; therefore, fidelity could not be assessed for the 2016-2017 school year. A lack of professional development and no forced implementation led to differing practices and philosophies regarding the Mastery Learning framework.

Teacher responses acknowledged that the professional development was useful and that parents, students, and other teachers comprehended the purpose for the change and embraced it. Prior to the whole school implementation, from the focus group results, it was apparent that although some teachers knew parts of the Mastery Learning Framework, Pink Elementary School teachers had differences in implementation and use of the parts of the framework in their individual classrooms. All teachers at Pink Elementary School agreed that as of the 2017-2018 school year, they were now implementing the Mastery Learning framework with fidelity. Unfortunately, without observations, I was unable to verify these claims. Meyers and Brandt's (2015) research on implementation fidelity indicated that implementation fidelity is a key issue for every program developer and researcher designing, executing, interpreting, or communicating work. However, implementation fidelity cannot be assured through perceptual data. I cannot measure exactly how close to fidelity Pink Elementary School is with solely perceptual data, which is also a limitation.

Several teachers at Pink Elementary school had been using some of the components of the Mastery Learning framework in isolation for years but had done so with little training. Interestingly, 33.4% of teachers had less than 10 years of teaching experience and may have simply followed the status quo of the school in regard to the

Mastery Learning framework. Data indicated that many teachers had not fully understood the components of the framework before the 2017-2018 school year. Others reported that they had learned one part of the framework and had used it exclusively in isolation. A previous lack of training, coupled with the complexity of the entire Mastery Learning framework, may have led to the low rate of implementation fidelity before the 2017-2018 school year.

Recommendations

In accordance with accepted research on implementation fidelity, I recommend that additional short trainings on the use of the Mastery Learning framework in areas of students learning at their own pace, assessing student progress, and providing feedback/remediation, and finally, testing final learning criteria be scheduled for the following school year. The purpose of the trainings should be to ensure that the fidelity of implementation continues to be a priority in the school setting. I recommend in order to measure fidelity with more validity, the site should create fidelity criteria to include aspects of structure and process. According to Mowbrey (2003), structure encompasses the framework for service delivery, and process comprises the way in which services are delivered. Fidelity criteria often include specification of the length, intensity, and duration of the service, content, procedures, and activities over the length of the service; roles, qualifications, and activities of staff; and inclusion/exclusion characteristics for the target service population to determine fidelity levels with more validity. Defining these terms as set by Mowbrey would be my first recommendation for the following school year.

In addition, I recommend further research be conducted to compare the reading

achievement and growth of this school to a similar school using the Mastery Learning framework to determine if there is a difference in overall scores.

Limitations

The findings from this research study are only applicable to the particular school studied, and no generalizations can be made in regard to the wider educational community. Additionally, it is necessary to note that all of the teachers at Pink Elementary School are implementing the Mastery Learning Framework; however, I requested participation from third-, fourth-, and fifth-grade teachers and data only, because although kindergarten, first, and second grade teachers also have final learning criteria, I determined EOGs, as a standardized measure, would be a reliable, valid assessment to measure final learning criteria. The study, being mixed methods, with quantitative and qualitative data, includes specific steps to maximize the internal validity of the study. Furthermore, it is necessary to take into consideration the possibility of researcher bias due to the nature of the qualitative research methodology. Additionally, all the data with regard to implementation are based on teacher reporting of practices with no additional data to support teacher claims.

Summary of Findings

Findings from this study indicate that the teachers at Pink Elementary School perceived the changes in the implementation of the Mastery Learning framework in a positive manner. Teachers additionally perceived an increase in student motivation through learning at their own pace, which they attributed to the school-wide emphasis on using the program with fidelity. Furthermore, teachers indicated that the data available to them through the Mastery Learning framework were used to drive instruction and small

groups. Although most teachers perceived increases in achievement in the classroom through testing final learning criteria being achieved, some teachers were undecided on the impact that the Mastery Learning would have on EOG achievement and growth scores. Overall, the teachers at Pink Elementary School embraced the changes in the Mastery Learning framework at the time of the study and were using the framework with varying levels of fidelity. The changes in the Mastery Learning framework implementation slowly evolved into a belief that the Mastery Learning framework was a valuable development by teachers in their understanding and implementation of the framework.

As teachers are met with demands to implement new educational practices and instructional interventions to improve student learning, school leaders are able to meet these challenges with strong professional development and support. Guskey (2010) echoes this, reminding teachers of a need to make improvements, forcing schools to move on with implementation in hopes that results will be positive for their teachers and students with regard to achievement. Mastery Learning is the one framework that encompasses multiple research-supported strategies with a record of accomplishment of relevance over decades (Guskey, 2010). Slavin (1987) defined Mastery Learning as a method of instruction where the focus is on the role of feedback in learning; Mastery Learning includes a category of instructional methods that establish a level of performance all students must master before moving on to the next unit. Student work time and positive small group experiences have been shown to contribute to student learning, retention, and overall college success.

References

- Altman, D. G. (1991). Sample size. In D. G. Altman (Ed.), *Practical statistics for research* (pp. 455-460). Chapman & Hall.
- Ames, C. (1992). Goals, structures, and student motivation. *Journal of Educational Psychology, 84*(2), 261–272.
- Anderson, L. W. (1975, March). *Major assumptions of mastery learning*. Annual Meeting of the Southeast Psychological Association, Charleston, SC.
- Anderson, S. A. (1994). *Synthesis of research on mastery learning*. ERIC. [Files.eric.ed.gov/fulltext/ED382567.pdf](http://files.eric.ed.gov/fulltext/ED382567.pdf)
- Anderson, S., Barrett, C., Hutson, M., Lay, L., Myr, G., Sexton, D., & Watson, B. (1992). *A mastery learning experiment*. ERIC.
- Anderson, L. W., & Burns, R. B. (1987). Values, evidence, and mastery learning. *Review of Educational Research, 57*, 215–223.
- Arredondo, D. E., & Block, J. H. (1990). Recognizing the connections between thinking skills and mastery learning. *Educational Leadership, 47*(5), 4–10.
- Astin, A. (1993). *What matters in college? Four critical years revisited*. Jossey-Bass.
- Babbie, E. R. (2010). *The practice of social research* (12th ed.). Wadsworth Cengage.
- Bambrick-Santoyo, P. (2010). *Driven by data: A practical guide to improve instruction*. Jossey-Bass.
- Becker, R., Elvery, J., Foster, L, Krizan, C. J., Nguyen, S., & Talan, D. (2005). *A comparison of the business registers used by the Bureau of Labor Statistics and the Bureau of the Census*. Paper presented at 2005 Joint Statistical Meetings, Alexandria, VA.

- Black, P., Harrison, C., Lee, C., Marshall, B., & Wiliam, D. (2003). *Assessment for learning: Putting it into practice*. Open University Press.
- Blakemore, D. (1992). *Understanding utterances*. Blackwell.
- Block, J. H. (1971). *Mastery learning: Theory and practice*. Holt, Rinehart & Winston.
- Block, J. H., & Anderson, L. W. (1975). *Mastery learning in classroom instruction*. Macmillan.
- Block, J. H., & Burns, R. B. (1976). 1: Mastery learning. *Review of Research in Education*, 4(1), 3–49. <https://doi.org/10.3102/0091732X004001003>
- Block, J. H., Efthim, H. E., & Burns, R. B. (1989). *Building effective mastery learning schools*. Longman.
- Bloom, B. S. (1968a, May). Learning for mastery. *UCLA Evaluation Comment*, 1, 1-12. <http://programs.honolulu.hawaii.edu/intranet/sites/programs.honolulu.hawaii.edu.intranet/files/upstf-student-success-bloom-1968.pdf>
- Bloom, B. (1968b). *Learning for mastery* (2nd ed., Vol. 1). Center for the Study of Evaluation.
- Bloom, B. S. (1971). Mastery learning. In J. H. Block (Ed.), *Mastery learning: Theory and practice* (pp. 47–63). Holt, Rinehart & Winston.
- Bloom, B. S. (1976). Human characteristics and school learning. McGraw-Hill.
- Bloom, B. S. (1978). New views of the learner: Implications for instruction and curriculum. *Educational Leadership*, 35(7), 563–576.
- Bloom, B. S. (1981). *All our children learning: A primer for parents, teachers, and other educators*. McGraw-Hill.

- Bloom, B. S. (1984a). The 2 sigma problem: The search for method of group instruction as effective as one-to-one tutoring. *Educational Researcher*, 13(6), 4–16.
<http://dx.doi.org/10.3102/0013189X013006004>
- Bloom, B. S. (1984b). The search for methods of group instruction as effective as one-to-one tutoring. *Educational Leadership*, 42(8), 4–17.
- Bloom, B. S. (1988). Helping all children learn in elementary school and beyond. *Principal*, 67(4), 12–17.
- Bloom, B. S., Madaus, G. F., & Hastings, J. T. (1971). Handbook on formative and summative evaluation of student learning. New York: McGraw-Hill.
- Brookfield, S. D., & Preskill, S. (1999). *Discussion as a way of teaching: Tools and techniques for democratic classrooms*. Jossey-Bass.
- Butler, R. (2000). What learners want to know: The role of achievement goals in shaping information seeking, learning, and interest. In C. Sansone & J. M. Harackiewicz (Eds.), *Intrinsic and extrinsic motivation: The search for optimal motivation and performance* (pp. 161–194). Academic Press.
- Butler, R. (2007). Teachers' achievement goal orientations and associations with teachers' help seeking: Examination of a novel approach to teacher motivation. *Journal of Educational Psychology*, 99(2), 241–252.
- Cabazon, E. (1984). *The effects of marked changes in student achievement pattern on the students, their teachers, and their parents: The Chilean case*. Unpublished doctoral dissertation, University of Chicago.

- Callahan, M., & Meixner, M. (2020). How do I create tests for my students?
www.depts.ttu.edu/tlpdc/Resources/Teaching_resources/TLPDC_teaching_resources/Documents/HowdoICreateaTestforMyStudentswhitepaper.pdf
- Carroll, J. B. (1963). A model of school learning. *Teachers College Record*, 64(8), 723-733.
- Carroll, J. B. (1989). The Carroll model: A 25-year retrospective and prospective view. *Educational Researcher*, 18(1), 26-31.
- Chan, K. S. (1981). *The interaction of aptitude with mastery versus non-mastery instruction: Effects on reading comprehension of grade three students* [Unpublished doctoral dissertation]. University of Western Australia.
- Changeiywo, J., Wambugu, P., & Wachanga, S. (2010, November 3). Investigations of students' motivation towards learning secondary school physics through mastery learning approach. Retrieved July 10, 2015, from https://www.academia.edu/35169655/investigations_of_students_motivation_towards_learning_secondary_school_physics_through_mastery_learning_approach
- Clark, C. R., Guskey, T. R., & Benninga, J. S. (1983). The effectiveness of mastery learning strategies in undergraduate education courses. *The Journal of Educational Research*, 76(4), 210–214.
- Couper, M. P. (2008). *Designing effective web surveys*. Cambridge University Press.
- Creswell, J. (2005). *Educational research: Planning, conducting, and evaluation quantitative and qualitative research* (2nd ed.). Pearson.
- Damavandi, M. E., & Kashani, Z. S. (2010). *Effect of mastery learning method on performance and attitude of the weak students in chemistry*. Elsevier.

- Dane, A. V., & Schneider, B. H. (1998). Program integrity in primary and early secondary education: Are implementation effects out of control? *Clinical Psychology Review, 18*(1), 23–45.
- Darling-Hammond, L. (2015). *How should we measure student learning? 5 keys to comprehensive assessment*. Edutopia.
- Drago-Severson, E. (2011). *How adults learn*. Learning Forward, Learning Designs. Learningforward.org/wp-content/uploads/sites/21/2017/12/Drago-Severson_-_How_Adults_Learn.pdf
- Dusenbury, L., Brannigan, R., Falco, M., & Hansen, W. (2003). A review of fidelity of implementation: Implications for drug abuse prevention in school settings. *Health Education Research: Theory and Practice, 18*(2), 237–256.
- Dweck, C. S. (1986). Motivational processes affecting learning. *American Psychologist, 41*(10), 1040–1048.
- Earl, L. M. (2003). *Assessment as learning: Using classroom assessment to maximize student learning*. SAGE Publications.
- Edmunds, K., & Bauserman, K. (2006). What teachers can learn about reading motivation through conversations with children. *Reading Teacher, 59*(5), 414-424. Doi:10.1598/RT.59.5.1
- Ellis, S. (2019). *What is mastery learning?* Getting Smart. www.gettingsmart.com/2019/08/what-is-mastery-learning/
- Gentile, J. R., & Lailey, J. P. (2003). *Standards and mastery learning: Aligning teaching and assessment so all children can learn*. Corwin.

- Goodlad, J. I., & Anderson, R. H. (1959). *The nongraded elementary school*. Harcourt Brace.
- Guskey, T. R. (1987). Rethinking mastery learning reconsidered. *Review of Educational Research*, 57(2), 225–229.
- Guskey, T. R. (1988). Response to Slavin: Who defines best? *Educational Leadership*, 46(2), 26–27.
- Guskey, T. R. (1989). Attitude and perceptual change in teachers. *International Journal of Educational Research*, 13(4), 439–453.
- Guskey, T. (1990). Cooperative mastery learning strategies. *The Elementary School Journal*, 91(1), 33–42.
- Guskey, T. R. (1997). *Implementing mastery learning* (2nd ed.). Wadsworth.
- Guskey, T. R. (2007). Closing achievement gaps: Revisiting Benjamin S. Bloom's "learning for mastery." *Journal of Advanced Academics*, 19(1), 8–31.
- Guskey, T. R. (2009). Mastery learning. In T. L. Good (Ed.), *21st century education: A reference handbook* (Vol. I, pp. 194–202). Sage.
- Guskey, T. R. (2010, October). Interventions that work: Lessons of mastery learning. *Educational Leadership*, 68(2), 52–57.
- Guskey, T. (2015). *International encyclopedia of the social & behavioral sciences*. Elsevier.
- Guskey, T. R., & Gates, S. L. (1986, May). *Synthesis of research on the effects of mastery learning in elementary and secondary education*. ASCD.

- Guskey, T. R., & Pigott, T. D. (1988). Research on group-based mastery learning programs: A meta-analysis. *The Journal of Educational Research*, *81*(4), 197–216. <https://doi.org/10.1080/00220671.1988.10885824>
- Hall, G. E., & Loucks, S. F. (1977). A developmental model for determining whether the treatment is actually implemented. *American Educational Research Journal*, *14*(3), 263–276. <https://doi.org/10.3102/00028312014003263>
- Hammersley, M. (1996). The relationship between qualitative and quantitative research: Paradigm loyalty versus methodological eclecticism. In J. T. E. Richardson (ed.), *Handbook of research in psychology and the social sciences*. BPS Books.
- Hanover Research. (2012). Best practices in personalized learning environment. <https://www.hanoverresearch.com/media/Best-Practices-in-Personalized-Learning-Environments.pdf>
- Hay, I. (2005). *Qualitative research methods in human geography* (2nd ed.). Oxford University Press.
- Heathers, G. (1977). *A working definition of individualized instruction*. ASCD. http://www.ascd.org/ASCD/pdf/journals/ed_lead/el_197702_heathers.pdf
- Hiebert, E. H. (1987). The context of instruction and student learning: An examination of Slavin's assumptions. *Review of Educational Research*, *57*, 337–340.
- Huitt, W. (1996). Measurement and evaluation: Criterion- versus norm-referenced testing. *Educational Psychology Interactive*. Valdosta State University. <http://www.edpsycinteractive.org/topics/measeval/crnoref.html>

- Hymel, G. M., & Dyke, W. E. (1993). *The internationalization of Bloom's learning for mastery: A 25-year retrospective-prospective view*. Paper presented at the annual meeting of the American Educational Research Association, Atlanta, GA.
- Iarossi, G. (2006). *The power of survey design: A users guide for managing surveys, interpreting results, and influencing respondents*. The World Bank.
- International Baccalaureate. (2019). *Benefits of the IB*. Author. www.ibo.org/benefits/
- Johnson, R. B., Onwuegbuzie, A. J., & Turner, L. A. (2007). *Toward a definition of mixed methods research*. SAGE Publications.
- Joyce, B. (1987). A rigorous yet delicate touch: A response to Slavin's proposal for 'best-evidence' reviews. *Educational Researcher*, 16(4), 12–14.
- Kampen, M. (2019). How mastery learning helps every student succeed. *Prodigy*, 1–4.
- Kazu, I. Y., Kazu, H., & Ozdemir, O. (2005). The effects of mastery learning model on the success of the students who attended "usage of basic information technologies" course. *Educational Technology & Society*, 8(4), 233-243.
- Keller, F. S. (1967). Engineering personalized instruction in the classroom. *Revista Interamericana De Psicología/Interamerican Journal of Psychology*, 1(3).
<https://doi.org/10.30849/rip/ijp.v1i3.445>
- Killion, J. (2016). Implementation fidelity affects the degree of change in teacher practice. *Learning Forward*, 37(3). 56-59. learningforward.org/journal/june-2016-issue/implementation-fidelity-affects-the-degree-of-change-in-teacher-practice/
- Kim, H. (1969). *A study of the bloom strategies for mastery learning*. Korean Institute for Research in the Behavioral Sciences (In Korean).

- Kim, H. (1970). *The mastery learning project in the middle schools*. Korean Institute for Research in the Behavioral Sciences (In Korean).
- Kulik, J. A., & Kulik, C. C. (1989). Meta-analysis in education. *International Journal of Educational Research*, 13(2), 221–340.
- Kulik, C. C., Kulik, J. A., & Bangert-Drowns, R. L. (1990). Effectiveness of mastery learning programs: A meta-analysis. *Review of Educational Research*, University of Michigan, 60, 265–299.
- Laerd. (2012). *Qualitative, quantitative and mixed methods dissertations*.
dissertation.laerd.com/getting-started-p2.php
- Laerd. (2018). *Independent t-test for two samples*. Laerd Statistics, LUND Research.
statistics.laerd.com/statistical-guides/independent-t-test-statistical-guide.php
- Lambert, C. M., & Jackson, R. R. (2010). *How to support struggling students (mastering the principles of great teaching)*. ASCD.
- Langeheine, R. (1992). *State mastery learning: Dynamic models for longitudinal data*. Paper presented at the annual meeting of the American Educational Research Association, San Francisco, CA.
- Larmer, J. (2016, February 18). Assessing student learning. Retrieved February 21, 2017, from https://www.bie.org/blog/gold_standard_pbl_assessing_student_learning
- Levine, D. (1985). *Improving student achievement through mastery learning programs*. Jossey-Bass.
- Linn, R. L. (2002). The measurement of student achievement in international studies. In A. C. Porter, & A. Gamoran (Eds). *Methodological advances in large-scale cross-national education surveys* (pp. 25-57). National Academy Press.

- Martinez, J., & Martinez, N. (1999). Teacher effectiveness and learning for mastery. *The Journal of Educational Research*, 92(5), 279-285.
- McLeod, S. (2008). Likert scale. *Simply Psychology*. www.simplypsychology.org/likert-scale.html
- Meece, J., & McColskey, W. (1997). *Improving student motivation: A guide for teachers and school improvement teams*. Southeastern Regional Vision for Education.
- Mevarech, Z. R. (1981). *Attaining mastery on higher cognitive achievement*. Paper presented at the annual meeting of the American Educational Research Association, Los Angeles, CA.
- Mevarech, Z. R., & Werner, S. (1985). Are mastery learning strategies beneficial for developing problem solving skills? *High Education*, 14, 425–432.
<https://doi.org/10.1007/BF00136514>
- Meyers, C. V., & Brandt, W. C. (2015). *Implementation fidelity in education research: designer and evaluator considerations*. Routledge.
- Motamedi, B., & Sumrall, W. J. (2000). Mastery learning and contemporary issues in education. *Action in Teacher Education*, 22(1), 22–32.
- Mowbrey, C. (2003). Fidelity criteria: Development, measurement, and validation. *American Journal of Education*, 24(3), 318.
- Nannini, K. (2012). *Math and English language arts student data tracking binders*. Young Teacher Love. youngteacherlove.com/student-data-tracking-binders-freebie/

- Newman, I., & Benz, C. R. (1998). *Qualitative-quantitative research methodology: Exploring the interactive continuum*. Carbondale: Southern Illinois University Press.
- North Carolina School Report Card. (2017). North Carolina Department of Public Instruction. www.dpi.nc.gov/data-reports/school-report-cards
- North Carolina Teacher Working Conditions. (2018, June 1). Teacher working conditions survey results. Retrieved May 29, 2019, from <http://www.ncteachingconditions.org/results/report/153/63664>
- O'Donnell, C. (2008). Defining, conceptualizing, and measuring fidelity of implementation and its relationship to outcomes in k–12 curriculum intervention research. *Review of Educational Research*, 78(1), 33-84.
10.3102/0034654307313793
- Osewalt, G. (2014). Individualized instruction vs. differentiated instruction. Retrieved January 22, 2017, from <https://www.understood.org/en/school-learning/partnering-with-childs-school/instructional-strategies/individualized-instruction-vs-differentiated-instruction>
- Penuel, W., Fishman, B., Yamaguchi, R. (2007). What makes professional development effective? Strategies that foster curriculum implementation. *American Educational Research Journal*, 44(4), 921-958. doi:10.3102/0002831207308221
- Pope, C., & Mays, N. (2006). *Qualitative methods in health research, in qualitative research in health care* (3rd ed.). Blackwell Publishing Ltd.
doi:10.1002/9780470750841.ch1

- Postlethwaite, K., & Haggarty, L. (1998). Towards effective and transferable learning in secondary school: The development of an approach based on mastery learning. *British Educational Research Journal*, 24(3), 333–353.
- Prawat, R. S. (1992). Teachers' beliefs about teaching and learning: A constructivist perspective. *American Journal of Education*, 100, 354–395.
- Quain, S. (2019, Feb. 12). *The focus group research method*. Chron. smallbusiness.chron.com/focus-group-research-method-17464.html
- Reezigt, B. J., & Weide, M. G. (1990). *The effects of group-based mastery learning on language and arithmetic achievement and attitudes in primary education in the Netherlands*. Paper presented at the annual meeting of the American Educational Research Association, Boston, MA.
- Sampson, D. G. (2017, Oct. 11). Teaching analytics: Analyze your lesson plans to improve them. *ELearning Industry*. elearningindustry.com/teaching-analytics-analyze-lesson#:~:text=Classroom%20teachers%20commonly%20use%20structured,deliver%20it%20to%20their%20students
- Sarason, S. B. (1971). *The culture of the school and the problem of change*. Allyn and Bacon.
- Satterly, D. (1981). *Assessments in schools*. Blackwell.
- Sheldon, K. M., & Biddle, B. J. (1998). Standards, accountability, and school reform: Perils and pitfalls. *Teachers College Record*, 100(1), 164–180.
- Sieber, J. (1992). *Planning ethically responsible research: A guide for students and internal review boards*. Sage.

- Slavin, R. E. (1987). Mastery learning reconsidered. *Review of Educational Research*, 57(2), 175–213. <https://doi.org/10.3102/00346543057002175>
- Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Pearson Education, Inc.
- Tomilson, C. (2003). *Fulfilling the promise of the differentiated classroom: Strategies and tools for responsive teaching*. Association for Supervision and Curriculum Development.
- Understood. (2014, April 17). Remedial programs: What you need to know. www.understood.org/en/learning-thinking-differences/treatments-approaches/educational-strategies/remedial-programs-what-you-need-to-know?_ul=1%2Ab032t2%2Adomain_userid%2AYW1wLWtvZEJkbf3c1ZJVjlqbmRjdTV6T1E
- Walberg, H. J. (1988). Response to Slavin: What's the best evidence? *Educational Leadership*, 46(2), 28.
- Walberg, H. J. (1990). Productive teaching and instruction: Assessing the knowledge base. *Phi Delta Kappan*, 71, 470–478.
- Waxman, H. (2020). Classroom observation: Purposes of classroom observation, limitations of classroom observation, new directions. *StateUniversity.com*. education.stateuniversity.com/pages/1835/Classroom-Observation.html
- West, C. (2020). *Teaching to the test: Pros and cons*. ThoughtCo. thoughtco.com/teaching-to-the-test-pros-and-cons-4158535

- Whiting, B., & Render, G. F. (1984). *Cognitive and affective outcomes of mastery learning: A review of 16 semesters*. A paper presented at the Annual Meeting of the Northern Rocky Mountain Education Research Association, Jackson, Wyoming.
- Whiting, B., Van Burgh, J. W., Render, G. F. (1995). *Mastery learning in the classroom*. Paper presented at the annual meeting of the American Educational Research Association, San Francisco, CA.
- Wiggins, G. P., & McTighe, J. (2005). *Understanding by design*. Association for Supervision and Curriculum Development.
- Wright, P. D., & Wright, P. D. (1994, November 23). Questions and answers on least restrictive environment requirements of the IDEA – Wrightslaw.
<https://www.wrightslaw.com/law/osep/lre.osep.memo.1994.1123.pdf>
- Wu, W. Y. (1994). *Mastery learning in Hong Kong: Challenges and prospects*. Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA.
- Wyse, S. E. (2011). What is the difference between qualitative research and quantitative research? <http://www.snapsurveys.com/blog/what-is-the-difference-between-qualitative-research-and-quantitative-research/>
- Yildiran, G. (2006). *Multicultural applications of mastery learning*. Faculty of Education, Bogazici University.

Appendix A

Survey Items

Survey Items

Thank you for completing the following survey on your experience with Mastery Learning Framework over the past 2 years. Please be completely transparent in your responses and answer each question as completely honest as possible. The survey should take approximately five minutes to complete.

1. I used Mastery Learning Framework in my classroom prior to this school year.
(Strongly Agree — Agree — Neutral — Disagree — Strongly Disagree)
2. I specify learning and how it will be evaluated as it relates to Mastery Learning in my classroom.
(Strongly Agree — Agree — Neutral — Disagree — Strongly Disagree)
3. I believe that the Mastery Learning Framework allows students in my class to learn at their own pace.
(Strongly Agree — Agree — Neutral — Disagree — Strongly Disagree)
4. I believe assessing student progress and providing feedback and remediation are an important part of each learning opportunity.
(Strongly Agree — Agree — Neutral — Disagree — Strongly Disagree)
5. I pull small groups for mastery learning to occur.
(Strongly Agree — Agree — Neutral — Disagree — Strongly Disagree)
6. I test final learning criteria to see if it has been achieved in my classroom.
(Strongly Agree — Agree — Neutral — Disagree — Strongly Disagree)
7. EOGs are a good data point to see if final learning criteria has been achieved in my classroom.
(Strongly Agree — Agree — Neutral — Disagree — Strongly Disagree)
8. I put emphasis on small group work and remediation to achieve mastery.
(Strongly Agree — Agree — Neutral — Disagree — Strongly Disagree)
9. I currently use data from Mastery Learning.
(Strongly Agree — Agree — Neutral — Disagree — Strongly Disagree)
10. I currently provide feedback for my students.
(Strongly Agree — Agree — Neutral — Disagree — Strongly Disagree)

Appendix B
Focus Group Questions

Focus Group Questions

1. Describe the way you used Mastery Learning Framework in your classroom prior to this school year.
2. Describe the process of specifying learning and how it will be evaluated as it relates to Mastery Learning in your classroom.
3. Do you believe that the Mastery Learning Framework allows students in your class to learn at their own pace? Explain.
4. What does assessing student progress and providing feedback and remediation look like in your classroom or grade level?
5. Prior to this school year, how much time did you spend pulling small groups for mastery learning to occur? Describe what took place during this time in your classroom.
6. What does testing final learning criteria to see if it has been achieved in your classroom or grade level look like? Explain.
7. Would you consider EOGs to be a method of final learning criteria? Why or why not?
8. How much emphasis do you put on small group work and remediation to achieve mastery? Describe what takes place in your classroom.
9. Do you currently use data from Mastery Learning? Explain.
10. How do you currently provide feedback for your students?

Appendix C
Focus Group Protocol

Focus Group Protocol

Questions for the focus group will be based on previous survey responses designed to dig deeper and gather more extensive data.

1. Group members will have the opportunity to interact and communicate as a whole.
2. Researcher will pose a question to the focus group and the group will have the opportunity to talk to one another and share thoughts, ideas, ask questions to one another, and express beliefs and opinions to the group as a whole.
3. Researcher is able to use this experience to understand better why and how individuals think the way that they do.