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Walden University

College of Education and Human Sciences

This is to certify that the doctoral study by

Regina LaShonda Bynum-Gray

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

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Walden University
2025

Abstract

Elementary Mathematics Teachers' Experiences Addressing Student Learning Loss

by

Regina LaShonda Bynum-Gray

MA, Prairie View University, 1982

BS, Texas Woman's University, 1980

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Education

Walden University

May 2025

Abstract

The problem was the COVID-19 pandemic-related learning loss of Grade 3–5 students in mathematics within Texas public schools (TPS). Studying this problem was important to address learning loss to avoid other academic issues. The purpose of this basic qualitative study was to explore TPS Grades 3–5 mathematics teachers' instructional practices and the support needed to improve students' pandemic-related learning loss. The conceptual framework that was used in this study was learning loss recovery, which consists of evidenced-based practices grouped into four categories: opportunities for additional learning time, assessment, student social and psychological wellness, and support for teachers. This basic qualitative study included a purposive sample gathered through social media of 10 Grades 3–5 teachers who had at least three years teaching mathematics in TPS and who taught before, during, and after the pandemic. Qualitative data from semistructured interviews were thematically analyzed after a priori, open, and axial coding and informed four themes. To address learning loss recovery, TPS Grade 3–5 mathematics teachers (a) used evidenced-based instructional practices, although they were sometimes ineffective; (b) found formative assessment and creating opportunities for additional learning time essential to learning loss recovery, (c) received positive support from school and district administrators during and after COVID-19, but the support was sometimes ineffective, and (d) need professional development and resources tailored to the specific needs of addressing learning loss recovery in mathematics. The study findings emphasize the necessity of comprehensive professional development for educators to effectively address learning loss and inequities in mathematics performance among marginalized students.

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Dedication

I dedicate my dissertation work to my loving and supportive parents, the late Rosie Lee Wheatfall-Bynum and Wilbert Bynum, who promised me that I can do all things through Christ that strengthen me. I trust that both of you were aware of all the obstacles that I faced, but through it all, they have made me a better person and educator and trusting that knowledge makes one more aware of one's purpose. A special thanks to my oldest sister Shirley Bynum-Jackson for always being a major part in my educational success.

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Thanks to my immediate family for your support during this time. To my husband, Billy Joe Gray Sr., thank you for always encouraging me in ways you did not know. To Billy Joe Gray II, thank you for trusting in me and sharing that warm smile and strong will to know that you are my child. Thanks to the elementary mathematics teachers who were willing to give up their time to become a part of my study. Thanks to my four grandchildren Bylin, Aybian, Ayllie-Allanay, and Bynlie to allow my journey to help them understand the importance of higher education and to have a positive pathway to follow.

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Chapter 1: Introduction to the Study

In March 2020, schools in the United States were closed due to the COVID-19 pandemic. School administrators and teachers were obligated to deliver emergency remote learning online. With only 1 day notice in Texas school districts, educators had to transition from on-site to online learning (Varela & Fedynich, 2021). There was limited time to design an efficient remote program, mainly because K-8 teachers and administrators had little experience with remote learning (Kleinke & Cross, 2022). Some school administrators and teachers had no prior remote experience, making the sudden shift to a long-term online model difficult for school administrators and teachers (Bubb & Jones, 2020; Kraft et al., 2021).

Students were inexperienced with online education, and elementary students in the third, fourth, and fifth grades struggled greatly to use the technology, particularly without prior instruction on the applications implemented (Bailey & Lee, 2020). Parents were left to assist their children with remote learning while working from home or after returning from work; and they sometimes sought assistance from family members, other parents, friends, tutors, and nannies (Garbe et al., 2020). The challenges that COVID-19 brought affected K–8 students' math and reading skills, according to data from students who completed fall screening (Berger et al., 2021). Math losses were consistently more significant than reading losses in late elementary and middle school, and those effects were consistent across school strata, poverty rates, and race/ethnicity (Zamarro et al., 2021).

Transitioning from traditional face-to-face learning to online or remote learning could be difficult for learners and instructors (Leech et al., 2022). Remote learning enabled students to study at their own pace while teachers instructed them remotely. However, during the remote learning of COVID-19, the cancellation of in-class learning disrupted education worldwide (Skar et al., 2021). A challenge with remote learning was determining how many students had access to the Internet (Sari & Nayır, 2020).

Studying teachers' practices addressing learning loss due to a pandemic like COVID-19 could lead to implementing effective teaching approaches with a curriculum that includes hybrid or remote learning for underachieving students in Texas public schools (TPS). The study could also help fill the gap in the literature regarding remote learning for K-8 students and eliminate problems for instructors and students during widespread learning interruptions, such as those caused by a worldwide pandemic.

Overview

Chapter 1 contains the following sections: background, problem, purpose, research questions, conceptual framework, nature of the study, definitions, assumptions, scope, limits, and significance. In the background section, I define the research topic and identify the target audience. I discuss concepts, terms, and theories that may be unfamiliar to the audience. I cite relevant literature in detail and establish the research's context.

Background

Literature Related to the Scope of the Study

Teaching mathematics to third- through fifth-grade students became more challenging due to COVID-19. According to Harper et al. (2021), in the summer and fall of 2020, schools began moving beyond emergency remote instruction by considering ways to support mathematics learning more effectively remotely. As a result of school closures and the switch to remote learning due to COVID-19, Engzell et al. (2021) projected that cumulative learning loss could be severe, especially in mathematics. The lost instructional time hurt reading and mathematics learning (Oberg et al., 2022). Napolitano (2021) noted that 4.4 million Grades 3–8 students were behind in arithmetic in 2020–2021, identified as a learning loss.

The COVID-19 pandemic exacerbated primary mathematics gaps for underachieving students (Dorn et al., 2020). Dorn et al. (2021) analyzed COVID-19's effect on Grades 1–6 achievement by examining math and reading completion rates. Dorn et al. reviewed 1.6 million in-school i-Ready tests provided in 40 states throughout the pandemic. As a result of the epidemic, students fell 5 months behind in mathematics and 4 months behind in reading. Remote learning widened unaddressed opportunity and achievement gaps for underprivileged youngsters (Catalano et al., 2021; Darling-Hammond et al., 2020). This finding was crucial to my research because most students have not met their learning objectives.

The COVID-19 epidemic exacerbated educational inequality. Remote learning had disproportionately affected African American, Hispanic American, and Indigenous

communities (Dorn et al., 2020). African American and Hispanic American students may be 6 to 12 months behind students from other racial and ethnic groups in mathematics (Kuhfeld et al., 2022). Pressley et al. (2021) stated that the loss for African American and Hispanic American students was connected to less access to technological devices and the internet. According to 2017 and 2019 National Assessment Educational Progress (NAEP) data, African American, Hispanic American, and Indigenous students had low percentages of students at proficiency levels before COVID-19 remote learning (see National Center for Education Statistics, 2022b).

In the COVID-19 transition process, teachers had difficulties engaging students and parents, lacking school/district guidelines, and student Internet and computer access issues (Greenhow et al., 2022; Johnson et al., 2022). Giorgio-Doherty et al. (2021) criticized public schools' lack of a framework for teaching and learning during a shutdown. Because of the sudden, severe, and widespread nature of this COVID-19 crisis, students were currently "absent" engaged in "remote" activities (Keese et al., 2022). Concerns expressed by teachers about absenteeism because of online learning shed light on the relationship between learning and instructional time. Santibanez and Guarino (2021) used research on the effects of school absences on learning to forecast the effects of remote learning during COVID-19 because with the transition to remote learning, many students could not fully participate in remote learning opportunities due to numerous constraints. The researchers found that the effects of absenteeism vary by grade and subgroup academically and social-emotionally and that students suffer more from absenteeism in mathematics than in English language arts. The most profound

effects were on students with disabilities, children who were homeless or in foster care, and students who received free and reduced-price lunches (Santibanez & Guarino, 2021). Like certain racial minority groups, students with disabilities and those receiving free and reduced-price lunches had low NAEP mathematics proficiency levels during 2017 and 2019 (National Center for Education Statistics, 2022b).

Gap in Practice and Significance

The gap in practice was that many Grade 3–5 mathematics students within TPS continued to underachieve after COVID-19 pandemic-related remote learning. Understanding the practices these teachers used and their need for support in addressing learning loss for students in mathematics can improve academic outcomes for many students, thus leading to positive social change. Positive social change could occur by providing teachers with the support to help students struggling with mathematics learning loss after the pandemic.

Problem Statement

The problem I addressed through this study was the COVID-19 pandemic-related learning loss of Grade 3–5 students in mathematics within TPS. The pandemic prevented about 40 million prekindergarten through eighth-grade students from entering or returning to their classrooms during the first semester (Office of Civil Rights, 2021). Children in prekindergarten through fifth grade make up about 27 million of those who were affected; many of them had been deprived of critical social resources, including resources related to healthcare and education (Office of Civil Rights, 2021). Engzell et al. (2021) reported that cumulative learning loss, especially in mathematics, could be severe

because of school closures. More specifically, teaching mathematics to third through fifth-grade students, a critical developmental period for learning mathematics, became more challenging due to COVID-19 (Harper et al., 2021). Napolitano (2021) confirmed that learning loss in mathematics included 4.4 million Grades 3–8 students behind in arithmetic in 2020–2021.

The National Center for Education Statistics administered a special version of the NAEP Long-Term Trend (LTT) reading and mathematics exams for age 9 students, which was the age of the typical fourth grader, comparing scores from the winter of 2020 to the winter of 2022. Compared to 2020, the average math scores for children aged 9 fell by 7 points (National Center for Education Statistics, 2022c). The percentage of students scoring proficient or above on the regularly administered mathematics NAEP for the United States, comparing 2019 to 2022, decreased by 5% (see Table 1). The 2022 average fourth grade NAEP mathematics score (236) was 5 points lower than the previous year (241) and the lowest the score had been since 2005 (National Center for Education Statistics, 2022a, p. 2).

Table 1

Percentage of Fourth Grade Students Proficient or Above on Mathematics NAEP in the United States and Texas from 2017-2022

	% Students Scoring Proficient or Above in Mathematics			
Group	2017	2019	2022	Difference from 2019 – 2022
United States	40	41	36	↓5
Texas	41	44	38	↓6

Note. The data source for this table is National Center for Education Statistics. (2022a). *NAEP Report Card: 2022 NAEP mathematics assessment: Highlighted results at grades 4 and 8 for the nation, states, and district.* https://www.nationsreportcard.gov/highlights/mathematics/2022/

In this study, I focused on TPS, consisting of approximately 160 elementary schools. In 2022, Texas had 5,156,972 students enrolled in 8,161 schools in 1,022 districts. There were 344,362 teachers in the public schools, or roughly one teacher for every 15 students, compared to the national average of 1:16. Mathematics performance was a concern in a TPS with a significant decline in overall math achievement on NAEP and statewide standardized tests from 2019 to 2022, post-COVID-19 remote learning. For fourth-grade students' proficiency percentages decreased by 5 points from 2019 to 2022 (see Table 1).

The proficiency level percentages were also low on the Texas state standardized mathematics assessment. The Texas Education Commissioner, Mike Morath, at the State of Education Summit in October 2021 stated that,

> After four years of intervention, they [students] caught up to state averages in reading, they never caught up in mathematics. [The] track record of accelerating instruction learning getting children to learn more than a year's worth of content in a year's worth of time at the scale of all children has not been strong. (Carter, 2021, para. 4)

Similarly, Lopez (2021) reported that the pandemic seemed to have erased years of improvement for Texas students meeting proficiency levels in math and reading. Table 2 shows the percentages of the TPS third- to fifth-grade students who met or were above grade level on the state standardized mathematics test offered in the spring of 2019, 2021, and 2022. From 2019 to 2021, the percentage decreased for each grade level, ranging from a 12-18% decrease.

Table 2

Percentage of Students in TSP Who Meet Grade Level or Above on Mathematics STARR Assessment

	% Students at or above grade level in Mathematics STARR			
Grade level	2019	2020	2021	2022
3	49	No Data	31	43
4	48	Due to	36	43
5	58	Pandemic	44	48

Note. The data source for this table is the Texas Education Agency (2019, 2021, and 2022) *Texas Academic Performance Reports*. https://rptsvr1.tea.texas.gov/perfreport/tapr/tapr_srch.html?srch=S

There was an improvement in proficiency levels on the state-standardized mathematics assessment in 2022 compared to 2021; however, the 2022 percentages are still lower than in 2019, and less than 50% of all students were at or above grade level

(see Table 2; Pruneda, 2023). Elementary mathematics scores were still a concern in 2022 because students had not regained the ground they lost during the pandemic (Fogel, 2022; Mervosh, 2022; Pruneda, 2023). Thus, the gap in practice was that many Grade 3–5 mathematics students within TPS continue to underachieve after COVID-19 pandemic-related remote learning. Understanding the instructional practices teachers used to instruct struggling students and the support they need to help students in mathematics could improve academic outcomes for many students, thus leading to positive social change.

Purpose of the Study

The purpose of this basic qualitative study was to explore TPS Grades 3-5 mathematics teachers' instructional practices and the support needed to improve students' pandemic-related learning loss. The research paradigm for the study was the interpretivist paradigm. A research paradigm refers to the philosophical framework upon which is the basis for research and offers a system or pattern of beliefs and understandings from which the research project operates (Kivunja & Kuyini, 2017). The interpretivist paradigm is used by researchers to operate on the following beliefs: that knowledge and reality are socially constructed, that context is vital for knowledge and understanding, and that it is crucial to understand individuals instead of universal laws (Kivunja & Kuyini, 2017). Because the study was qualitative, the interpretivist paradigm was appropriate for the study.

Research Questions

I used the following research questions to guide this study.

Research Question 1 (RQ1): What instructional practices do TPS Grade 3–5 mathematics teachers use to address student learning loss?

Research Question 2 (RQ2): What supports do TPS Grade 3–5 mathematics teachers need to address student learning loss?

Conceptual Framework

Concepts and Phenomenon Defined

In qualitative research, a phenomenon is a concept, event, or experience studied and analyzed (Taherdoost, 2022). The concepts of learning loss recovery research comprised the framework guiding this study. *Learning loss recovery* is the strategies or practices educators may take to recover learning loss due to school closures and remote learning (Hanover Research, 2020). The phenomenon of study was TPS Grade 3–5 mathematics teachers addressing student learning loss. There is no one framework to inform learning loss recovery globally. Instead, as shown in Appendix A and as I discuss in Chapter 2, there are myriad practices that, when working in concert, set the stage for successful learning loss recovery. The four categories of best practice for learning loss recovery include: (a) opportunities for additional learning time, (b) assessment, (c) student social and psychological wellness, and (d) support for teachers. The research reveals that best practices in these four categories—working together and separately—are effective in promoting learning recovery (see Allensworth & Schwartz, 2020; Hanover Research 2020, 2021; Morton & Hashim, 2023; Scalciciolli, 2021; The World Bank, 2023; The World Bank et al., 2022).

Relationship of Framework to Study

Like learning lost during the summer, students lost learning time during remote learning due to COVID-19, referred to by Kuhfeld et al. (2020) as the "COVID-19 slide." According to NWEA research, preliminary COVID-19 learning-loss projections suggested students would return in Fall 2020 with less than 50% of the learning gains in mathematics and in some grades, ending nearly a full year behind what would be expected under normal in-class teaching conditions (Kuhfeld et al., 2020). Hanover Research (2020), Kuhfeld et al. (2020), and Salciccioli (2021) used summer learning loss research to understand the relief, rebuilding, and recovery needed to improve learning lost during the pandemic.

I used learning loss recovery research concepts to address the research problem and questions. I used the four categories of learning loss recovery to design the interview questions about mathematics teachers' instructional practices and the support they may need when helping underachieving students. I provide more information regarding the framework in Chapter 2.

Nature of the Study

In this study, I used a basic qualitative design. I interviewed 10 TPS Grade 3–5 mathematics teachers about the instructional practices they used to instruct struggling students and the support they needed to address student learning loss. Typically, researchers use the basic qualitative approach to extract people's impressions of things external to themselves (Erickson, 1985).

Rationale

Generally, the basic qualitative design is used to obtain information on real-world events, processes, and personal experiences from representative people (Percy et al., 2015). This approach adheres to four essential principles: establishing the researcher's viewpoint, distancing method from technique, declaring the researcher's commitment to rigor, and defining the researcher's analytic lens (Caelli et al., 2003). Bailey (2014) cited teacher interviews as a critical strategy for collecting qualitative research data.

Key Concepts

The key concepts related to this study were mathematics teachers' instructional practices used to address learning loss and the support teachers needed to address student learning loss. I was specifically interested in interviewing teachers of third to fifth-grade students. I used thematic analysis to analyze the qualitative data collected in this study (see Clarke & Braun, 2013).

Methodology

Participants were Grade 3–5 mathematics educators who taught during and after the COVID-19 pandemic. Potential participants had at least 3 years of teaching mathematics to TPS Grade 3–5 students. Next, I explain the concepts or aspects I explored throughout my study and how I used those concepts for clarity and consistency.

Definitions

COVID-19 slide: Academic setbacks typical of summers throughout an extended school closure due to COVID-19 (Kuhfeld et al., 2020).

Learning-loss: Projections suggested students would return in the fall of 2020 with less than 50% of the learning gains in mathematics and some grades ending nearly a full year behind what would be expected under traditional in-class teaching conditions (Kuhfeld et al., 2020).

Learning loss: Students not retaining knowledge and learning when they are out of school for extended periods, such as over summer break, and when they are not engaged and formally supported in their learning (Alexander et al., 2007).

Learning recovery or *learning loss recovery*: Steps recommended in research that educators should take to improve learning loss due to school closures and remote learning (see Hanover Research, 2020; Kuhfeld et al., 2020).

Remote learning: Teaching methods and approaches that allow students and teachers to remain connected and engaged with course content while in separate locations with digital applications and web-based connectivity (Fernandez & Shaw, 2020).

Assumptions

Marshall and Rossman (2014) defined assumptions as "the features and conditions of a study that a researcher believes to be true" (p. 49). Researchers indicated that COVID-19 has affected schooling globally (Kuhfeld et al., 2022). Within educational institutions, I assumed that the obstacles encountered by instructors grew during the epidemic. Second, I assumed that mathematics instructors were qualified to express their insights about addressing student learning loss. Finally, I assumed that participants would respond candidly and freely to interview questions.

These assumptions were critical because having firsthand knowledge from the participants and having them respond honestly lends credibility to the data-gathering process. In the next section, I share how in depth my study is and give the readers the research questions and the parameters in which the study operated concerning the sample, population, and timeframe mentioned earlier. I also discuss potential transferability.

Scope and Delimitations

Scope refers to the boundaries within which a research project would be conducted. Delimitations refer to the choices made by the researcher and describe the parameters set for the study. Transferability refers to the degree to which research results can be transferred to other contexts or settings with other participants (Marshall & Rossman, 2014). I discuss these aspects of the study in the next sections.

Bounds of Study

To gather information about teachers' instructional practices used to instruct struggling students and the support they need to help students in mathematics, this study's ideal sample size was 10 to 12 TPS Grade 3–5 mathematics teachers. The population included only third to fifth-grade math teachers. I used an interview to gather data, which I conducted virtually or in person, depending on the location and preference of the participant. The participants had at least 3 years of previous teaching experience. The location was TPS. I excluded administrators, parents, and students from the study.

Transferability

In qualitative research, transferability is like generalizability in quantitative research. The researcher establishes transferability by detailing how the findings can be

generalized to other settings, situations, times, and groups. As the researcher, I could not guarantee that the research study's findings would be applicable. Instead, I provided evidence that the research could be applicable. The transferability of qualitative study findings depends on several factors, including detailed descriptions of how the study was carried out and the ability to be carried out in a different environment (Maxwell, 2021). In each interview, I outlined and detailed all aspects of this study. Even given the uniqueness of the setting, the study findings may be transferable. A researcher should provide enough information about the research so that they can draw parallels between the study and other studies to which the research can be applied. A researcher should provide readers with enough information about the research so that they can draw parallels between the study and other studies to which the research can be applied (Patton, 2015).

Qualitative studies are designed to obtain in-depth information that quantitative studies with large samples cannot (Mwita, 2022). Although the findings may not transfer well, the study yielded in-depth data and provided in-depth insight into the topic. As the researcher, I used confirmability to eliminate bias or personal motivation (see Anney, 2014). To ensure dependability, I created an audit trail showing every step of the data collection and analysis (see Malterud, 2001; Stahl & King, 2020). The following paragraphs share those characteristics of design or methodology that could have influenced the findings.

Limitations

Design Limitations

The limitations of qualitative interviews included reliance on respondents' accuracy and intensity regarding time, expense, and possible emotional strain (Adhabi & Blash Anozie, 2017). These limitations could occur when ineffective interview questions are composed. For this study, I ensured that the participants had open-ended, clear, applicable, and unbiased questions to avoid limitations in creating qualitative interview questions. For qualitative data, not having effectively coded data, which involves identifying themes across interview data, could be a limitation. I avoided this limitation by reading and rereading interview transcripts until I had a clear idea about the interview themes (see Braun et al., 2017). The following section explains why my study was needed and could contribute to my education.

Biases That Could Influence Study Outcomes

Researcher bias is a potential limitation in qualitative studies because data analysis is based on the researcher's judgment. During the entire study process, I maintained objectivity and endeavored to reduce bias. Most prejudices can be avoided by skillfully crafting the questions and organizing the interview (Ritchie et al., 2013). I used a semistructured interview guide for each participant and kept a reflexive journal. To avoid bias and obtain feedback on questions, I also conducted a pilot test of the interview questions with two elementary school mathematics teachers who met the study criteria, except they did not teach in TPS. I used the pilot test to practice interviewing before I conducted the study interviews (Kvale, 1996; Yin, 2014). For greater openness, when

writing the dissertation, I described the precautions used to prevent bias during participant recruitment, qualitative questioning, and analysis and reporting.

Significance

Contributions from the study could assist educators, policymakers, and the learning community in determining the best practices for reversing learning loss in the event of a global pandemic or any significant interruption to student learning. The study's potential contributions to practice or policy advancement could allow teachers to provide strategies that other teachers could use and identify the assistance teachers needed to support their struggling students further. Positive social change could occur by providing teachers with the support to help students struggling in mathematics. The study's findings could give third to fifth-grade mathematics teachers and other stakeholders data about forming partnerships to bolster teacher resources during a pandemic. Other researchers might use this qualitative technique to collect data regarding teachers' ongoing struggles to offer supportive resources for low-achieving pupils during and after a pandemic.

Summary

The COVID-19 pandemic led to significant learning losses in mathematics for third to fifth-grade students in TPS. The problem was the COVID-19 pandemic-related learning loss of Grade 3–5 students in mathematics within TPS. Studying this problem was important to address learning loss to avoid other academic issues. The purpose of this basic qualitative study was to explore TPS Grades 3–5 mathematics teachers' instructional practices and the support needed to improve students' pandemic-related learning loss. The conceptual framework that guided this study included the concepts of

learning loss recovery research. I interviewed 10–12 TPS Grade 3–5 mathematics teachers in TPS to investigate their experiences addressing learning loss. The research focused on teachers' instructional practices and needed support. Learning loss due to extended school closures and remote learning resulted in students losing knowledge and disengagement. School administrators should implement learning recovery strategies, focusing on teaching methods that allow students and teachers to remain connected and engaged with course content in separate locations. Qualitative research emphasizes transferability, ensuring generalizability and external validity. The study included 10–12 mathematics teachers from TPS, focusing on third- to fifth-grade mathematics learning losses for students. Open-ended, clear, applicable, and unbiased questions were used to reduce bias. The findings could assist policymakers and practitioners in developing effective instructional techniques that teachers could use during a pandemic, such as COVID-19 or other major interruptions to student learning. The next chapter is Chapter 2, which includes a review of the relevant literature on the topic.

Chapter 2: Literature Review

The problem I addressed through this study was TPS Grade 3–5 mathematics teachers' experiences addressing student learning loss within TPS. The purpose of this basic qualitative study was to explore TPS Grades 3-5 mathematics teachers' instructional practices and the support needed to improve students' pandemic-related learning loss. The COVID-19 pandemic significantly affected K-12 student learning, leaving students approximately five months behind in mathematics (Catalano et al., 2021; Darling-Hammond et al., 2020). The shift to remote learning significantly and adversely affected underachieving students, widening the academic gap between them and their non-underachieving peers (Giorgio-Doherty et al., 2021). In Chapter 2, I discuss the literature search strategy, how the conceptual framework of learning loss recovery could be used to address learning losses after remote learning, and the literature related to key concepts, including research on learning loss. I end the chapter with a summary and conclusions based on the information discussed in the chapter.

Literature Search Strategy

Previous research courses encourage scholars to use full-text peer-reviewed articles published in the United States in the past 5 years. Most of the research discussed in the literature review falls within 2019-2023. I searched the Walden University Library databases for publications on learning loss, learning loss recovery, and mathematics instructional practices to address learning loss recovery for this literature review. I also used Google Scholar, ERIC, Academic Source Complete, SAGE Journals, and Education Source databases. I searched for relevant literature using the following combination of

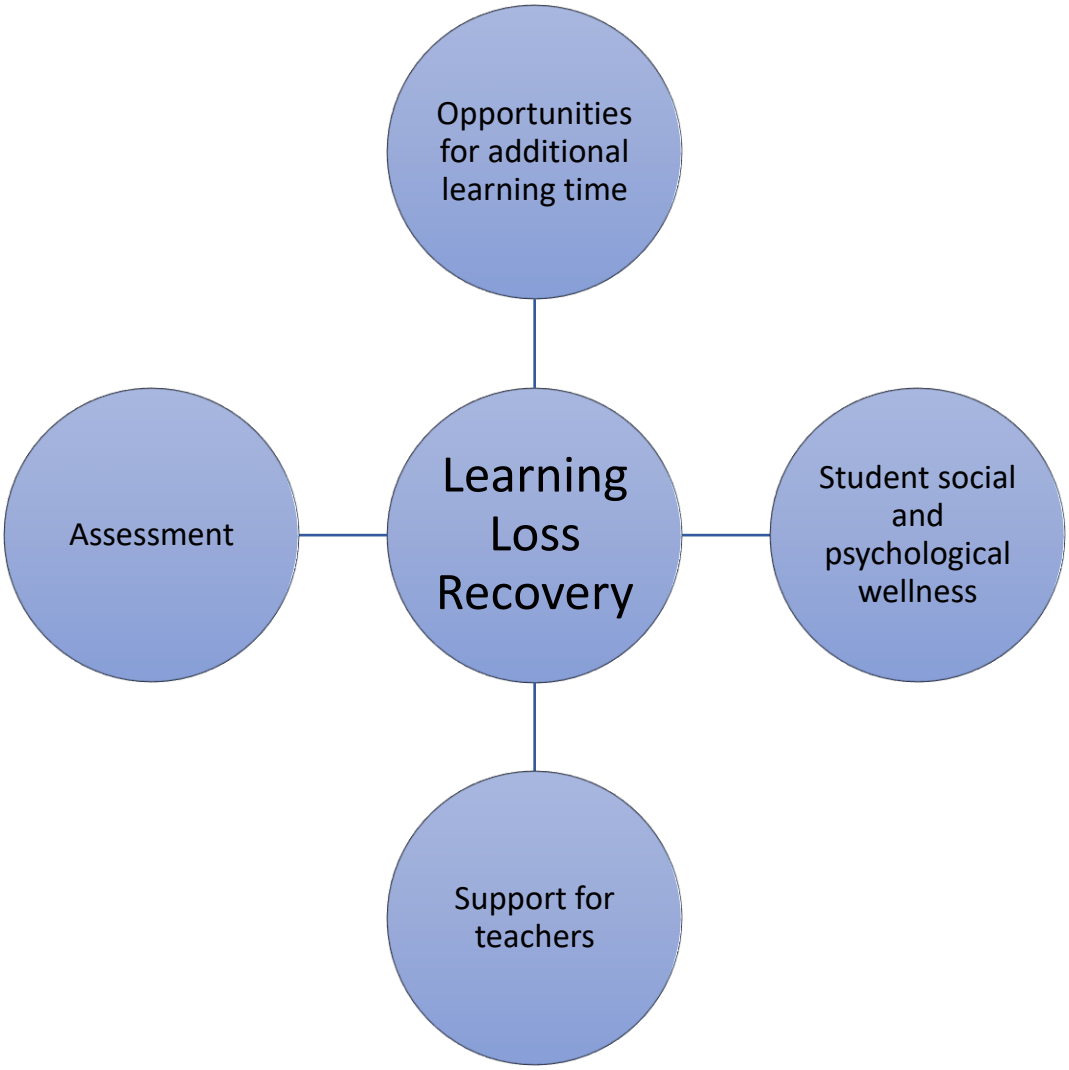
keywords: *primary* or *elementary school*, *learning loss* or *learning loss recovery*, *summer learning slide*, *COVID-19 and learning slide, instructional strategies* or *practices* and *mathematics* or *math,* and *mathematics* or *math* and *best practices*, *learning loss recovery* or *learning loss* and *mathematics* or *math*, *learning loss recovery* and *instructional strategies* or *practices*, *learning loss recovery* and *tutoring* or *after school program* or *summer school* or *extended learning time, learning loss recovery* and *professional development* or *teacher training*, *differentiated instruction*, *explicit instruction*, *manipulatives*, *cooperative learning*, *conceptual understanding*, and *computer-assisted instruction*. I also used the reference list from articles to find additional sources.

Conceptual Framework

Learning loss recovery was the conceptual framework that guided this study. Qualitative researchers could use a conceptual framework, defined as a network of interlinked concepts used to understand a phenomenon, as a lens to understand better and explain a social phenomenon (Jabareen, 2009). The research on learning loss recovery does not provide a one-size-fits-all framework for learning loss recovery; however, there are overlapping concepts or components that, when used, can lead to effective learning loss recovery. Appendix A includes a full analysis of these overlapping components. For this study, the four research-based categories are: (a) opportunities for additional learning time, (b) assessment, (c) student social and psychological wellness, and (d) support for teachers. These categories represent the conceptual framework for learning loss recovery (see Figure 1).

Figure 1

Learning Loss Recovery Framework



The researchers who have written about learning loss recovery discussed evidenced-based practices that fall into all or some of these categories. To explain the framework of this study, I presented these categories for learning loss recovery, described each category and its application to learning loss recovery, and explained how they inform the problem, purpose, and method of this study.

Definitions of Concepts

Learning recovery or learning loss recovery were the steps recommended in research that teachers and school and district administrators should take to improve learning loss due to school closures and remote learning (Hanover Research, 2020). The concepts I explored in this framework were opportunities for additional learning time, assessment, student social and psychological wellness, and support for teacher.

Opportunities for Additional Learning Time

The category opportunities for additional learning time relates to students participating in activities beyond the usual classroom learning, such as high-impact tutoring, after-school programs, summer school, and extended time (see Allensworth & Schwartz, 2020; Cochran, 2021; Hanover Research, 2020, 2021; Morton & Hashim, 2023; Salciccioli, 2021)**.** High-impact tutoring is "defined as tutoring delivered two to three times per week for at least 30 minutes per session with four or fewer students in a group" (Morton & Hashim, 2023, p. 4). Increasing the learning time can include extending the school day or school year (Morton & Hashim, 2023). Highly efficient educators should lead these learning opportunities using high-quality curricula (Allensworth & Schwartz, 2020; Morton & Hashim, 2023).

Assessment

Not only is providing students with additional learning opportunities led by highly proficient educators, essential to learning loss recovery, but the students' progress must also be regularly evaluated and assessed (Allensworth & Schwartz, 2020). Assessment is important to learning loss recovery because educators need to determine what skills students have (diagnostic screening), apply the appropriate instructional strategies to promote achievement, and monitor and assess the progress they have made toward recovery (see Allensworth & Schwartz, 2020; Carvalho et al., 2020; Cochran, 2021; Hanover Research, 2020, 2021; Nebraska Department of Education, 2021; Peterson, 2021; The World Bank, 2023). The World Bank et al. (2022) recommended system-level and classroom-level assessments. Policymakers could use baseline system-level (e.g., national, regional) assessments to make informed decisions about the learning challenges and inequities in student learning (The World Bank et al., 2022). Formative and summative classroom-level assessments are essential for implementing recovery interventions and monitoring their effectiveness (Hanover Research, 2021; Salciccioli, 2021; The World Bank, 2023).

Student Social and Psychological Wellness

Although not included as a part of most learning recovery best practices, some researchers recommended also focusing on the social and psychological wellness of children who specifically lost learning during the COVID-19 pandemic because social, psychological, and academic success are related (see Allensworth & Schwartz, 2020; Cochran, 2021; Hanover Research, 2021; The World Bank et al., 2022). The negative

effects of the pandemic on students' social and psychosocial wellness are related to factors such as "isolation as a result of social distancing and uncertainty caused by the pandemic; experience or witnessing violence; death and illness among family members; concerns for family income and health, and others" (The World Bank et al., 2022, p. 116). Addressing students' social and psychological needs and supporting their well-being is crucial to ensuring that they can learn (The World Bank et al., 2022). Embedding mental health and psychosocial wellness in regular school instruction through outdoor activities and breathing exercises, for example, can allow students to share their emotions, practice mindfulness, and reflect (The World Bank et al., 2022).

Support for Teachers

Finally, teachers need practical support (e.g., professional development or coaching) and preservice training to effectively implement the practices for learning loss recovery (Carvalho et al., 2020; Nebraska Department of Education, 2021; Salciccioli, 2021; The World Bank, 2023; The World Bank et al., 2022). Recommendations from The World Bank et al. (2022) to support teachers in promoting learning loss recovery include:

- Equip teachers to assess students through support to implement assessment tools accurately, record and interpret data, and use it to make instructional decisions.
- Prepare teachers to support students' psychosocial wellness through in-school strategies and to identify students who require specialized support.
- Provide teachers with access to technology [and] build teacher skills in how to use technology to enhance educational delivery.

- Help teachers use technology to remediate gaps in learning –for instance, for implementing assessments, using peer-to-peer support groups, using self-guided learning programs, and others. (p. 12)

Thus, as teachers continue to address the challenges presented by distance learning they must be adequately supported through professional learning opportunities. Teacher support should also include collaboration and communication among teachers about best practices and individual students; in turn students could benefit academically, socially, and psychologically from the shared teacher knowledge and a strong support system (Salciccioli, 2021).

Primary Writings by Researchers Related to the Concepts

Many researchers have written about learning loss recovery and evidence-based practices, particularly concerning learning loss due to the COVID-19 pandemic. Appendix A lists these researchers and the overlapping concepts. Most research fell under the first two categories: opportunities for additional learning time and assessment. None of the researchers discussed concepts under all four categories. However, in this section, I share the primary research by Hanover Research (2020, 2021). Allensworth and Schwartz's (2020) worked with the EdResearch for Recovery group and that research was later updated by Morton and Hashim (2023). These researchers recommend practices across three of the four categories, and they provided the most extensive plans for learning loss recovery.

In their first report on learning loss recovery after schools resumed after the COVID-19 shutdown, Hanover Research (2020) identified four ways to address learning

loss recovery: (a) one-on-one tutoring programs; (b) adding time to learning, looping, creating individualized learning plans, and cross-grade collaboration; (c) merging school curricula into afterschool programs; and (d) cost-efficient afterschool, one-on-one tutoring, and summer learning programs. In a more extensive report, these steps were included, with the addition of trauma-informed practices, a social and psychological component (Hanover Research, 2021). For EdResearch for Recovery, Allensworth and Schwartz (2020) covered similar components: (a) high-impact tutoring, (b) extended learning time interventions, (c) strong systems to monitor students paired with routines, and (d) included social and emotional wellness, arguing that interventions are most effective when they also attend to students' socio-emotional needs. Some researchers acknowledged that not only do students lose academic learning following a crisis or traumatic event, like the COVID-19 pandemic, but they also need socio-emotional recovery (Cochran, 2021; Hanover Research, 2021; The World Bank, 2023). Building on the original EdResearch for Recovery report, Morton and Hashim (2023) focused on expanding opportunities for learning to accelerate students' academic recovery.

Application of Concepts in Previous Research

The most extensive research has been on the components of the category expanding access to learning opportunities to address learning loss recovery. In this section, I discuss the research related to these components, extended learning time, tutoring, after-school programs, and summer school. Next, I discuss the research in the learning loss recovery framework related to screening, monitoring, instruction, and

assessment, followed by student social and psychological wellness research, ending with research on support for teachers necessary for learning loss recovery.

Opportunities for Additional Learning Time

Researchers indicated many opportunities administrators and teachers can provide for students to promote learning loss recovery. These opportunities included extended learning time, summer learning, tutoring, and after-school programs. In this section, I discuss the evidence-based research related to these opportunities.

Extended Learning Time. Using additional instructional time to address learning loss has been a strategy for academic recovery. Acceleration academies taught by experienced educators that last a whole week and double-dose math structures can help students emotionally recover and reengage with their academics during the extended learning time (Wortham & Forgety Grimm, 2022). Current research suggested extending the school year for learning recovery (Kuhfeld et al., 2022). Dorn et al. (2020) suggested that school districts start the school year earlier or extend it into the summer as one strategy. Extended learning allowed students to make up for missed classroom or online study time (Jones, 2022). Clubs, excursions, and extra lessons are just some options for extended study. Summer school, or the extended year program, is meant to give students a place to continue their studies over the summer. Other studies on extending the school year showed elementary school, low-income, and struggling students benefit from extended school years (Blanden et al., 2022). Research on extended learning time agrees that attendance is important (McDonald et al., 2023). For students who cannot attend

additional in-person learning time, district leaders may consider hiring teachers willing to conduct remote instruction at night or on weekends (Carr-McMichael, 2022).

Summer Learning. Recent researchers recommended promoting learning recovery through summer school to extend the school year. The summer school program would add additional learning time and instructional program for the anticipated increase in learning. The U.S. Department of Education invested over 220 million dollars in private and public schools to support student recovery (Kuhfeld & Tarasawa, 2020). The U.S. Department of Education also assessed funds from the American Rescue Plan to give students enriched summer learning opportunities.

Researchers from the Education Development Center (EDC), a non-profit research and development organization, investigated summer learning loss recovery programs. The learning loss recovery would need at least 2 weeks to 2 months of academic growth over the summer. The effect of COVID-19 transitioning into summer school made recovery more challenging because students require time for relaxation and recovery from all the changes (Jiang et al., 2021). The existing summer school would look different from the past. A summer school program would add additional learning time and instructional program for the anticipated increase in students' learning needs due to COVID-19 learning loss. Effective summer learning programs have small class sizes, differentiated instruction, high-quality professional development, and coaching for instructors, aligned summer and school year curriculum, comprehensive and engaging programming, parent involvement and evaluation (Hanover Research, 2021; Schwartz et al., 2018)

Tutoring. Hanover Research (2020) suggested that school districts use one-on-one tutoring programs to improve academic performance and learning recovery. One-on-one tutoring programs show the largest educational performance improvement effect sizes and are cost efficient (Hanover Research, 2020)**.** Types of tutors vary across school districts. Ideally, instructors must be caring, knowledgeable in the content they teach, and skilled in assessing and choosing the approaches most suited for yielding optimal academic results (Mills et al., 2022). The same individuals must conduct extensive tutoring to help students achieve accelerated learning recovery to be effective (Zhou et al., 2022). Tutoring is an intervention designed to help improve student learning outcomes. Also, tutors must be knowledgeable about diagnosis and remediating students, including scaffolding instruction (Edger, 2017). Online learning has evolved, initially termed distance education, which may include private tutoring (Kentnor, 2015; Khamidzhanovna & Rakhmatullaevna, 2022).

There are various ways that tutoring can be experienced. Peer tutoring is also beneficial in learning loss recovery for both the tutor and tutee, with academic and social benefits (Hanover Research, 2021). Private tutoring for K-5 grade students supplements their formal public, charter, or private elementary school experience. Private tutoring strengthens low- and high-performing elementary students with core instruction (Guill et al., 2020). An online tutor for elementary school students has a variety of responsibilities, including serving as a facilitator, mentor, and motivator in addition to developing curriculum and modifying students' academic progress (Burdina et al., 2019).

Afterschool Programs. Researchers also found positive results of afterschool programs on student achievement (Hanover Research, 2021). However, the research on the effectiveness of afterschool programs is mixed (Morton & Hashim, 2023). Academic-focused afterschool programs aligned with a high-quality curriculum are most effective in improving academics (Morton & Hashim, 2023).

Assessment

The success of learning recovery practices, like opportunities for additional learning include diagnostic screening, monitoring, and assessment (Başokçu & Güzel, 2022). When school and district administrators identify student needs, they can address them better (Salciccioli, 2021). Lacking regular and reliable learning data could hinder learning recovery (Hanover Research, 2021; The World Bank, 2023). While successful schools may use different mathematics programs, they all "emphasized an aligned curriculum, dedicated time for math instruction and assessment, formative assessment and progress monitoring, and immediate intervention" (Hanover Research, 2021, p. 92). For mathematics instruction, the Institute of Education Sciences suggested using a combination of screening measures that were more focused along with the previous year's state testing results as a benchmark for initial screening for students in the elementary grades (Hanover Research, 2021). Screening, monitoring, and assessment tools strengthened educators' ability to individualize services and match specific interventions to the needs of different students (see Allensworth & Schwartz, 2020; the Nebraska Department of Education, 2021).

Student Social and Psychological Wellness

Strong, supportive relationships offer students extra protection as they recover from academic learning loss (Allensworth & Schwartz, 2020; Hanover Research, 2021). Research on the stress of school closures and the academic influence of Hurricane Katrina showed that while students experienced learning loss, the persistence of these losses depended on the supportive learning environment and the presence of stable and committed relationships (Allensworth & Schwartz, 2020). Psychosocial wellness is strongly related to better academic performance (The World Bank, 2023). Engaging parents, families, and communities to treat the whole child is beneficial to learning loss recovery (The World Bank, 2023).

Support for Teachers

Teachers could benefit from support such as professional development (Nebraska Department of Education, 2021; Salciccioli, 2021; The World Bank et al., 2002) and on-the-job and virtual coaching (Carvalho et al., 2020) to assist them in implementing the practices beneficial to learning loss recovery. Chicago Public School teachers received professional development on new curricula and how to effectively use additional instructional time to support higher-order mathematics thinking through student-centered instructional practices for low-performing ninth-grade students (Allensworth & Schwartz, 2020). As a result of the training, teachers were more likely to use new instructional modalities, and students' mathematics scores improved. Additionally, high-quality summer and tutoring programs require effective teachers. The Rand Corporation recommends, in addition to hiring the most effective teachers, that teachers be trained

before teaching any new program (Schwartz et al., 2018). Rand's recommendations include for trainers to: (a) familiarize teachers with the summer curriculum and how to teach it, (b) train teachers to avoid common culprits for classroom instruction time loss, (c) emphasize that engaging academic work is a part of summer fun, (d) train teachers to effectively check for student understanding, and (e) engage all instructional support staff in academic training sessions (Schwartz et al., 2018, p. x). Although these recommendations are specific to summer teaching, they offer benefits to any teacher implementing a new program.

How the Current Study Benefits From Framework

The various learning loss recovery strategies and concepts helped design this study. Summer learning allows students time to target specific needs to regain learning loss. The tutoring program gives students more one-on-one time with their instructor (Kraft & Falken, 2021). Teacher training lets teachers stay abreast of new curricula and teaching tools for struggling students. Explaining the need for learning loss recovery in elementary mathematics could allow teachers to face their challenges. After-school curricula that include school-day classroom instruction can better assist in learning loss recovery. I used the four categories of learning loss recovery to design the interview questions about mathematics teachers' instructional practices and the support they may need when helping underachieving students.

Literature Review Related to Key Concepts

In addition to the concepts of learning loss recovery, specific practices are effective in teaching mathematics to struggling students, like those who may have lost

learning due to the COVID-19 pandemic. These practices include explicit instruction, conceptual understanding, cooperative learning, meaningful and frequent homework, manipulatives, and differentiated instruction. I discuss the research on these practices as they relate to addressing the mathematics instructional needs of struggling students. Before I discuss these targeted instructional practices, I provide a history of the learning loss research, which focused mainly on summer learning loss.

History of Learning Loss

Entwisle et al.'s (2000, 2001) faucet theory provided the foundation for understanding learning loss. Entwisle et al. referenced the faucet theory in understanding what happens to students' academic knowledge and skills during summer breaks. Concerns about students losing ground academically during summer break go back at least a century, with early evidence suggesting that summer contributed to significant disparities in student outcomes (Johnson & Barker, 2022). When students are in school, the faucet of resources flows; when students are not, the faucet is turned off, and learning is limited (Alexander et al., 2007), adversely affecting the mastery and retention of information, leading to learning loss. Summer breaks interrupt the flow of resources and learning available to students, essential to steady academic progress (Alexander et al., 2007).

Since 1906, educational researchers have been intrigued by the phenomenon known as summer learning loss, setback, or slide (Cooper et al., 1996). Heyns (1978), Cooper et al. (1996), and Alexander et al. (2007) provided early research on learning loss,

focusing specifically on summer learning loss. Early evidence suggested that summer contributed to significant disparities in student outcomes (Alexander et al., 2007).

Heyns (1978) was one of the first researchers to study seasonal reading-related learning loss. Heyns followed sixth and seventh graders in Atlanta public schools for two years. The research yielded the following results: the number of books read over the summer is consistently associated with academic gains, and summertime use of the public library is more predictive of vocabulary gains than summer school attendance (Heyns, 1978). Heyns (1987) analyzed and interpreted literature on summer learning. The author reported methodological concerns in the prior studies analyzed that led to no absolute achievement loss for students during the summer; the average reading gains exceeded math gains, which is more evidence that summer losses occurred in math, particularly in the higher grades. Heyns concluded there was consensus that over the summer, children learn slower than during the school year. Additionally, elementary school summer programs did not appear to influence cognition; however, most of the research supported the effectiveness of school programs specifically for students considered disadvantaged (Heyns, 1987).

In the 1980s Beginning School Study, Alexander and Entwisle randomly selected 20 schools; six schools consisted of African American students, six schools consisted of European American students, and eight schools consisted of mixed student demographics to study mathematics achievement (Alexander & Entwisle, 2003). The researchers collected longitudinal data, which included standardized mathematics achievement test scores from five points in time in Grades 1, 2, and 3 (i.e., Fall 1982, Spring 1983, Fall

1983, Spring 1984, and Fall 1984). The independent variables included student and school type, economic standing based on eligibility for subsidized meals at school, two-parent versus one-parent household, and parent education level. Entwisle and Alexander found no significant achievement differences between the first-grade African American and European-American students.

Using a meta-analysis of 13 studies, which included Heyns (1978, 1987) and Entwisle and Alexander (1992, 1994), Cooper et al. (1996) found that the summer break had a negative effect on mathematics more so than on reading, especially in terms of calculation and spelling. The loss was equivalent to around 1 month on a grade-level scale, or one-tenth of a standard deviation from the test results from the spring.

The learning loss phenomenon showed that students' achievement scores typically fell by 1 months’ worth of academic learning over the summer break. Mathematics scores fell more dramatically than reading scores, and the loss was greater at higher grade levels (Alexander et al., 2016). Kuhfeld et al. (2022) found no differences in math learning during the summer or in either subject by gender or race. Importantly, Kuhfeld et al. also concluded that income-based mathematics gaps widened over the summer, given that children from middle-class backgrounds tended to see improvements in their reading abilities. In contrast, students from lower socioeconomic backgrounds were likely to see a decline.

There is no single solution to closing the academic gap between low- and high-income children (Entwisle et al., 2001). High-quality preschools and kindergartens could significantly improve low-income children’s academic performance. However, as they

progress through the first three grades, these children, particularly the most disadvantaged, require additional resources. Summer programs for children in the first and second grades emphasizing voluntary activities—recreational reading, organized sports, and various summer activities popular among middle-class families—showed promise in recovering from summer loss (Patrinos et al., 2022).

Similarly, research on learning loss after Hurricane Katrina found it took two years for students to recover academic achievement (Di Pietro, 2023). Research showed that learning losses were greater in mathematics than in reading. Studies showed that learning losses vary by grade. Learning losses hit higher in low-poverty schools. Findings from previous research on school closures suggest district administrators need to create long-term strategies to address learning beyond the current school year (Schult et al., 2022). In the next sections, I provided research on the best practices that are effective in mathematics achievement.

Explicit Instruction

Explicit instruction is the number one strategy when teaching mathematics (Hanover Research, 2021; Spooner et al., 2019). Mathematics words are made explicit to students, defined, and shown in context (Barnes & Stephens, 2019). When elementary school teachers use explicit direct instruction, they teach elementary mathematics students how to start and succeed on a task (Grossman et al., 2019). When using explicit instruction, mathematics teachers give students plenty of feedback and a chance to practice their learning (Lepp et al., 2021). Explicit instruction is a relational, contingent

practice that calls for teachers to devise strategies for utilizing students' abilities to encourage engagement (Johnson et al., 2022).

Conceptual Understanding

Focusing on conceptual understanding is another strategy that mathematics teachers can use with struggling learners. When students conceptualize mathematical ideas with an understanding of them, they have grasped those mathematical concepts (Videla et al., 2022). Students who exhibit conceptual understanding know more than isolated facts and methods (Schoenfeld, 2022). Students with this strategy understand why mathematical theory is essential and the kinds of contexts in which it is functional (Farsani et al., 2022). Conceptual understanding comes from teaching mathematics vocabulary when introducing a new lesson. Students who are procedurally fluent with conceptual understanding cannot only solve an equation such as $3x + 5 = 20$ for x by performing one or more steps, but they are also able to articulate the mathematics that supports the procedure they used and critique a different approach for solving that same equation (Schoenfeld et al., 2023). Conceptual understanding refers to an integrated understanding of mathematical concepts, encompassing more than just facts and methods; it enables students to understand their importance and usefulness in various contexts (Amjad et al., 2022).

Student verbalization is a strategy where the student expresses their thoughts, and the teacher records and transcribes their words for analysis. Verbalized mathematics, a common language for mathematical knowledge, is a crucial aspect of educational practice, enhancing mathematical vocabulary and understanding of mathematical

principles (Zhou & Zeng, 2022). When mathematical knowledge is expressed in general language, it is called verbalized mathematics (Cui et al., 2023). Previous studies on verbalized mathematics typically focused on mathematical vocabulary or educational practice. However, these studies did not exclude the role of symbolic mathematics ability, and almost no research has focused on verbalized mathematical principles (Cui et al., 2023). When students verbalize mathematics problems, they visualize what they know and need to know about the mathematics problem (Nazari & Hatami, 2023). The teacher should encourage students to verbalize justifications. The use of posing questions would make connections between ideas. A critical component of providing students with learning disabilities with access to high levels of mathematical reasoning—but it was a difficult skill to master (DeJarnette & Hord, 2022). Syafitri et al. (2020) analyzed fifth-grade students' logical thinking in mathematics. The findings suggested the need for teachers, educators, curriculum developers, and the government to develop learning instruction that supports logical thinking.

Cooperative Learning

Cooperative learning strategies are another instructional tool to help students participate and share what they learn in a group (Barnes & Stephens, 2019; Hanover Research, 2021). The simplest kind of cooperative learning, the Student Teams Achievement Division learning model, a cooperative learning approach significantly affects primary school pupils' mathematics learning outcomes (Arrahim et al., 2023). Al Kibtiyah and Iba (2022) found that the Numbered Heads Together cooperative learning strategy significantly affected student learning outcomes by increasing interaction and

promoting non-teacher-centered learning, boosting engagement among students and teachers. In a qualitative study, Ardiyani et al. (2019) explained how cooperative learning, or a cooperative approach, is crucial for primary school students to solve problems and communicate ideas. The study aimed to determine the effect of Think Pair Share cooperative learning models on arithmetic learning in fifth graders at three elementary schools. The researchers found that the cooperative learning model improved group establishment, the learning environment, learning achievement, student participation, information exchange, and interpersonal relations (Ardiyani et al., 2019). Millis (2023) explained how the Implementation Model of Cooperative Learning improved mathematics learning outcomes. A survey method and regression analysis techniques were used, with 36 participants from the SDN Kenari 07 Pagi, Salemba sub-district. Results showed that cooperative learning significantly influences fifth-grade elementary school students' mathematics learning outcomes (Millis, 2023). The cooperative learning model was a significant determining factor in addressing educational problems, highlighting the character development of children.

Using the Mathematics Achievement Test, Obafemi et al. (2023) found that the inverted jigsaw technique significantly affected students' mathematical abilities in mathematics. Obafemi et al. used a quasi-experimental research design in two public primary schools in Ilorin, Nigeria. One school was the experimental group that used the reversed jigsaw technique, and the other group was the control. The study lasted 6 weeks. This cooperative learning technique, reverse jigsaw, was used in classroom settings. Researchers used the jigsaw technique to break complex mathematical problems into

pieces to encourage collaboration and student engagement (Perkins & Saris, 2001). According to Sharkawi (2020), using the jigsaw technique would help students feel more engaged with the material and become more confident when asking for help from an instructor.

Meaningful and Frequent Homework

Providing meaningful and frequent homework is another excellent strategy for improving mathematics performance (Barnes & Stephens, 2019). In mixed-methods research, Cunha et al. (2019) examined the relationship between feedback types, school involvement, and students' learning outcomes from mathematics homework. Cunha et al. explored the effect of homework feedback on students, focusing on key areas such as definition, purpose, types, and perceived impact. Teachers' feedback to students, students' feedback to teachers, and self-feedback were identified as common methods. The findings offered guidance for maximizing students' learning and enhancing assignment feedback benefits from homework.

Manipulatives

Manipulatives are concrete objects that students could view and physically handle to demonstrate or model abstract concepts (Tseng et al., 2023). Mathematics manipulatives are objects, charts, and activities that engage learners while helping them develop their mathematics skills (Dumale & Gurat, 2023). Using manipulatives in mathematics education had proven effective in increasing students' understanding of mathematical concepts and involvement in learning (Kalogeropoulos et al., 2023). Manipulatives could assist in teaching lessons such as graphing, decimals, geometry,

arithmetic, and more. Using manipulatives in teaching mathematics allows students to construct their cognitive models for abstract mathematical ideas and processes (Arnal-Bailera & Arnal-Palacián, 2023). Manipulatives also use as a common language to communicate these models to the teacher and other students and engage students to increase both interest in and enjoyment of mathematics (Foulkes et al., 2023).

Utilizing puzzle pieces in mathematics instruction serves as an effective manipulative tool. Research shows that incorporating geometry puzzle games with scratch applications can meet students' diverse needs in a feasible, interesting, and useful manner (Purnamasari, 2023; Tjandra, 2023; Iskrenovic-Momcilovic, 2020). This evidence highlights the importance of engaging students through interactive learning methods, which can enhance their understanding and retention of mathematical concepts. By implementing these innovative strategies, educators can create a dynamic learning environment that fosters student interest and improves mathematical proficiency.

Differentiated Instruction

Differentiated instruction may be beneficial when addressing learning loss (Hanover Research, 2021). When students have multiple learning needs, the teacher can use differentiated instruction to identify and guide them. Differentiated instruction is student-centered, proactive, qualitative, and organic, combining whole-class, group, and individual instruction (Tomlinson, 2001). Differentiated instruction focuses on creating a conducive teaching and learning environment. Lai et al. (2020) investigated the effect of differentiated instruction interventions on sixth graders. Results showed that the intervention significantly improved students' mathematics self-efficacy, learning

motivations, and mathematical problem-solving skills. Lai et al.'s study complemented the proposed research because of the need for differentiated instruction for low performance in elementary mathematics. As students' learning needs are satisfied in a differentiated learning environment, successful learning experiences and positive emotional reactions such as self-efficacy may occur (Roberts & Inman, 2023).

Mathematics self-efficacy influences students' processes and strategies with which they study mathematics (Lai et al., 2020). Bandura (1997) defined self-efficacy as a belief, know-how, and ability to perform the behaviors required to achieve specific performance goals. McNeill and Polly (2023) investigated teachers' perceptions of K-2 students' mathematics self-efficacy, focusing on performance and differentiation in instruction. Zakariya's (2022) study revealed a significant correlation between students' self-efficacy in mathematics and their academic performance level. Teachers and policymakers should implement strategies that enhance pupils' self-efficacy beliefs in mathematics (Obafemi et al., 2023). When elementary teachers identify self-efficacy in students' mathematic knowledge, the students should become better empowered.

Computer-Assisted Instruction

Computer-assisted learning could promote learning recovery (Morton & Hashim, 2023). Computer-assisted instruction (CAI) provides a wide range of learning experiences through interactive activities, utilizing illustrations and examples to enhance understanding and engagement among students (Foster, 2023). CAI was built upon the theory of constructivism; that is, knowledge is constructed, or built upon prior knowledge (Kaya & Aydin, 2016). Cullen and Hertel (2023) used meta-analysis to examine

computer technology's effect on mathematics achievement, focusing on low-performing students. Results show a significant positive effect, with problem-solving systems having the most excellent computer technology effects.

Foster (2023) investigated the use of Dream Box learning as a mathematics intervention and its effectiveness in improving the math achievement of elementary students with math difficulties. Dream Box is an educational computer software, or a tool developed by Dyson and Lannin, that aids in learning mathematical concepts through the number line and promotes understanding of the magnitude and operations for whole numbers and fractions (Fuchs et al., 2021). The Dream Box offers students additional access to challenging activities, allowing them to direct instruction. U.S. schools invested in computerized curriculums to improve mathematics skills but lack evidence of improvement (Foster, 2023).

Gelgoot et al. (2020) found that the teachers thought using CAI in the classroom involved more work. As per Gelgoot's research, teachers found that the CAI-based mathematical education game significantly enhanced students' basic arithmetic skills despite the initial perceived workload. Additionally, teachers received more satisfaction because of students' deeper discussions and engagement. To advance common CAI use in society, more experiments and data must be collected to thoroughly demonstrate the process of students working with and using CAI (Beghetto, 2019). Conducting longitudinal studies using the skill CAI to examine prospective teachers' skills and attitudes as they enter the teaching profession as their primary career (Kara, 2020).

CAI, a computer-assisted instruction method, uses text to enhance learning through interactive tutorials, drills, and problems. Finding perceptions of elementary teachers who instruct digital literacy classes is even more difficult, both in the process and student learning outcomes. Prospective teachers are utilizing technology tools to enhance their instruction skills, thereby enhancing the overall effectiveness of the learning process. Using CAI is important to adapt teaching and learning to fit the individual student's preferences (Hariyanto et al., 2020). Other CAI include tutoring, game-based interventions, and computerized practice.

Summary and Conclusions

Major Themes in the Literature

The four categories of learning loss recovery research are: (a) opportunities for additional learning time, (b) assessment, (c) student social and psychological wellness, and (d) support for teachers, as well as the specific practices for teaching students who are struggling in mathematics are the main themes in the literature. Educators' difficulties while assisting pupils in making up for lost learning issues are specific to aiding pupils in Grades 3–5 to recover from learning loss. The problems were unique to the recovery from learning loss in mathematics. Teachers employ techniques to assist students in making up for lost learning.

What is Known in the Discipline Related to the Study Topic

The COVID-19 pandemic created a learning loss because students could not learn mathematics in the classroom; therefore, learning loss recovery is needed. According to the research I presented in the background section, the pandemic significantly affected K-

12 student learning, leaving students 5 months behind in mathematics and 4 months behind in reading by the end of the school year. This study addressed the COVID-19 pandemic-related learning loss of third- to fifth-grade mathematics students. During the pandemic, assisting underachieving students became more difficult based on their available resources and the resources they had at home to use for educational purposes. The pandemic increased the chances of the learning gap widening for minority students and students with disabilities. Understanding the instructional practices teachers were using will aid researchers and educators in better comprehending the phenomenon.

What is Not Known in the Discipline Related to the Study Topic

There is limited research on teachers' practices regarding learning loss and learning loss recovery for third- to fifth-grade students in mathematics due to COVID-19. Although there is research on practices, mathematics instruction, learning recovery, and learning loss, none of the studies have addressed the experiences of teachers in tackling learning loss in mathematics for third to fifth-grade students There is a need for more information about how teachers address learning loss recovery in mathematics. It is also necessary to determine what support teachers need to address the learning loss recovery and help underachieving students in being successful.

Gap in Practice as Indicated by Literature

Education practitioners and stakeholders need research that shows the recovery practices that teachers are using for learning loss and the support they need to address learning loss due to COVID-19. The gap in practice was that many Grade 3–5 mathematics students within TPS continue to underachieve after COVID-19 pandemic-

related remote learning. Therefore, interviewing teachers who teach these students was most relevant to this study. In this study, I focused on the experiences of third to fifth-grade mathematics teachers.

In Chapter 3, I discuss the research method used for this doctoral study, including the rationale for the design, the role of the researcher, methodology, data analysis plan, trustworthiness, and ethical procedures. The literature included the learning loss recovery framework and teachers' strategies to teach mathematics. The purpose of this basic qualitative study was to explore TPS Grades 3-5 mathematics teachers' instructional practices and the support needed to improve students' pandemic-related learning loss. I examined the experiences of mathematics teachers working with students experiencing learning loss and learning loss recovery in third, fourth, and fifth grade.

Chapter 3: Research Method

The purpose of this basic qualitative study was to explore TPS Grades 3-5 mathematics teachers' instructional practices and the support needed to improve students' pandemic-related learning loss. In this chapter, I discuss the basic qualitative research design and the rationale for choosing this design to address the research questions, followed by a discussion of my role as the researcher. Next, I detail the methodology, which includes justification for the selection of the participants, the interview protocol I designed to collect the data, procedures for recruitment, and the data analysis plan. I end the chapter with information about how I ensured the trustworthiness of the study findings, steps taken to protect the rights of the participants, and a chapter summary.

Research Design and Rationale

The central concepts that were the focus of this study were the practices, instructional strategies, and support of Grade 3–5 mathematics teachers in addressing learning loss. The problem presented in this study was the COVID-19 pandemic-related learning loss of Grade 3–5 students in mathematics in TPS. This problem raises questions about how teachers were addressing the problem. I used the following research questions to guide this study:

RQ1: What instructional practices do TPS Grade 3–5 mathematics teachers use to address student learning loss?

RQ2: What support do TPS Grade 3–5 mathematics teachers need to address student learning loss?

Description of Design

The research design for this study was a basic qualitative approach. Generally, basic qualitative research involves data collection from people representative of real-world events and processes or their experiences (Zhou, 2021). Basic qualitative research designs do not solely focus on beliefs, attitudes, or concepts; they should not be the primary driving force (Merriam & Tisdell, 2016; Patton, 2015). This approach should meet four basic requirements: noting the researcher's position, distinguishing method, and methodology, and identifying the researcher's analytic lens (Caelli et al., 2003). The basic qualitative research data collection can include teacher interviews (Bailey, 2014).

Justification

The basic qualitative approach was most appropriate for this study as it aligns with the study's purpose and problem (see Hamilton & Finley, 2019). A basic qualitative researcher studies people's world, experiences, and meaning (Creswell & Creswell, 2018; Maxwell, 2021). In this study I focused on participants' experiences rather than internal structure. In this study I focused on the opinions, life experiences, and participants' reflections (see Kostere & Kostere, 2021). Drawing from constructionism, phenomenology, and symbolic interaction, basic qualitative research aims to enhance educational practices and comprehensively understand successful educational processes (Yanto & Ramdani, 2023). I considered other qualitative and quantitative approaches before selecting a basic qualitative approach.

Quantitative Approaches

I did not select a quantitative approach because quantitative studies rely on numerical or measurable data (Creswell & Creswell, 2018), while qualitative data describe observed phenomena using language (Creswell & Creswell, 2018; Maxwell, 2021; Mulisa, 2022). Quantitative researchers aim to make predictions and generalize results to wider populations—goals that did not align with this study. In contrast, qualitative studies rely on personal accounts or documents that detail how people think or respond within society (Maxwell, 2021; Younas et al., 2023), which was the focus of this study.

Mixed-Methods Tradition

Mixed-methods research is an approach whereby researchers collect and analyze quantitative and qualitative data within the same study (Maxwell & Mittapalli, 2010). Mixed-methods researchers analyze quantitative and qualitative data on a single topic (Maxwell, 2021). When quantitative and qualitative data provide a better understanding of the research problem than either type, a mixed-methods design should be used (Hirose & Creswell, 2023). Mixed-methods approach uses quantitative and qualitative data to understand research study challenges better (Hirose & Creswell, 2023). I rejected this method because qualitative data can adequately address my research questions.

Phenomenological

Phenomenology, a type of qualitative study, is used to understand the fundamental meanings people build by interpreting their personal experiences (Knott et al., 2022). In-depth interviews are required for this methodological technique, and they

often run between 90 and 120 minutes. Phenomenological studies typically involve a small number of participants in conducting research. Researchers use this approach to study lived experience, expand their knowledge about a phenomenon, and gain a deeper understanding of how human beings think. I did not choose this approach because I was not interested in understanding the participants' thoughts. Rather, I was interested in exploring the experiences of Grade 3–5 mathematics teachers in addressing learning loss through their instructional practices and support needed.

Case Study

A case study design is used to focus on answering “how” and “why” questions the participant can answer (Yin, 2014). In case study research, the researcher explores essential contextual factors in a phenomenon, enhancing clarity and distinctions between phenomena and context. A case study is used to analyze a bounded situation that occurs over time through comprehensive, in-depth data collection from one or more groups (Asenahabi, 2019). When a basic qualitative researcher studies a particular issue, the researcher explores the population’s experiences of the phenomenon (Younas et al., 2023). In contrast, researchers often conduct case studies over a longer period, consisting of a few months to years, focusing more on observing and analyzing a specific ongoing phenomenon (Schoch, 2020). I did not choose the case study design because I only needed one form of data to address my research questions, and the phenomenon was not bounded.

Ethnographic

In ethnographic research, researchers gather data over an extended period to fully understand the cultural complexity within the target population (Uddin, 2022). Ethnographic research is employed for a complete understanding of complex and cultural processes through deep immersion and engagement with the target community (Borkovich, 2022). I did not select this method because data were not to be collected over an extended period, as the sample would likely lose information over time. However, the study focus was only on finding data about teachers' experiences addressing learning loss.

Summary

In conclusion, some problems cannot be measured statistically or qualitatively (Aronson, 1994). For several reasons, more focused qualitative approaches (e.g., ethnography, case study, grounded theory, or phenomenology) are not always appropriate. Researchers should consider using a more general qualitative inquiry approach in such cases.

Role of the Researcher

Researchers are the instrument or tool of data collection (Ellis et al., 2008). My role was that of a participant-observer who selected the tools and people to interview and the methods for interviewing and analyzing the data. To avoid researcher bias, I was responsible for objectively gathering data without bias, interference, discrimination, or prejudice (Creswell & Creswell, 2018). Therefore, the role of the researcher was multifaceted as it involved the work of a keen observer as well as the manager skills of a

project manager. I paid attention to fine details, listened closely to the participants, and probed for follow-up questions (Yin, 2014). I also implemented an audit trail by maintaining detailed records of all steps taken during the research process, including notes and transcripts of the interviews, which are available to other researchers. I was the only interviewer. I followed the ethical guidelines that Walden University's IRB outlined, including protecting human subjects. I ensured the confidentiality of participant information.

Professional Relationships

Professionally, I have been a classroom teacher for 33 years at five different schools in one Texas school district, with my last position serving as a middle school career technology education teacher in a different Texas school district. Although my desired participant pool included Texas elementary teachers, I solicited teachers through social media. I did not have a previous relationship or work experience with anyone included in this study. I had no prior or existing influence or control over potential participants or their curriculum.

Researcher Bias and Ethical Issues

Researchers could demonstrate bias through selective recall, interpretation, or poor questioning in which the interviewer only hears what the interviewer wants (Yin, 2014). As a researcher, I examined and documented my thoughts and opinions. I evaluated how objectively and thoroughly the thematic analysis was conducted to understand the topic better. I served as an observer in this research study by performing the task to the best of my ability without embedding research judgments, opinions,

comparisons, or prejudices in the data collection or analysis process (see Vagle, 2018). I kept a journal to record any biases, feelings, and observations made by participants and myself during the interviews. I used the journal to document what I did, what happened, and any thoughts about what the participants said during the interviews. During the data analysis, I used the journal to keep me on track and hold me accountable for interpreting exactly what the participants said as I transcribed and coded the interviews.

To avoid any ethical violations regarding my role as the researcher, I followed all the ethical guidelines established by Walden University's IRB. Participation was completely voluntary. I did not coerce participants for information before, during, or after the study's completion. I maintained participant confidentiality by deidentifying each person with an alphanumeric code (e.g., Participant 1, Participant 2).

Methodology

Participant Selection

The plan was to select 10–12 third to fifth-grade mathematics teachers for this study who have taught mathematics for at least 3 years in TPS. I recruited 12 participants from social media and the Walden University research pool. In this section, I provide an overview of the population, sampling strategy, and participant selection criteria. I also detail the process for verifying participant qualifications and the justification for the sample. Finally, I include an overview of the procedures for identifying, contacting, and recruiting participants.

Population & Sampling Strategy

The target population of this study consisted of third to fifth-grade mathematics teachers who taught during and after the COVID-19 pandemic in TPS. In 2022, TPS employed 122,920 mathematics teachers. In 2023, the number of employed mathematics teachers in TPS increased to 123,123 (Landa, 2023). This teacher information was not available by grade level; however, there are 6,728 public elementary schools in TPS (ElementarySchools.org, n.d.). Based on these numbers, it was feasible to obtain the desired sample for this study.

I recruited a purposive sample of TPS Grade 3–5 teachers. Researchers use purposive sampling to identify and select individuals or a group of individuals for a qualitative research study based on the participants' qualities, knowledge, and experience with the phenomenon under study (Etikan et al., 2016; Kandola et al., 2014). For this study, the purposive sampling method allowed me to select participants with experience teaching during the COVID-19 pandemic.

I used social media sites and the Walden University participant pool to invite potential participants. I initially wanted to recruit participants from one school district in Texas; however, the district was not accepting research applications from non-district employees. With the permission of the social media website administrators, I posted my study flyer on Facebook pages, where I was certain to find candidates who met the inclusion criteria. I located several Facebook sites for elementary mathematics teachers in TPS.

Participant Selection Criteria

To be included in this study, the participant had to: (a) be 18 years or older, (b) be a Grade 3–5 teacher who taught mathematics in TPS before, during, and after the COVID-19 pandemic, and (c) have at least 3 years of experience teaching mathematics. I determined that participants met these criteria when they responded to my invitation to join the study. In the invitation, I asked interested participants who met the study criteria to email me if they were interested in participating. After potential participants contacted me, I confirmed that they met the study criteria by having a checklist in the email reply to ask about their years of teaching and emailed the consent form to those who met the criteria.

Rationale for Number of Participants

The sample of 10 participants provided sufficient data saturation for this qualitative research study (see Etikan et al., 2016; Kandola et al., 2014). By carefully selecting teachers with experience teaching in TPS and knowledge of the phenomenon under study, the final sample of 10 provided rich and nuanced data to answer the research questions. There is debate against having a large sample size for qualitative studies (Miles et al., 2013). A researcher's goal is not to make a generalization based on the sample size but to explain, describe, and interpret the phenomenon, theme, central ideas, and trends in the data without regard to the number of participants and the number of opinions expressed by them (Maxwell & Mittapalli, 2010). The qualitative researcher should collect extensive details for a few individuals (Creswell & Poth, 2018). In qualitative studies, the focus should be examining the data quality in terms of the

participants' responses to the interview questions; many participants should not be the focus (Merriam & Tisdell, 2016; Yin, 2016).

How Participants Were Identified, Contacted, and Recruited

I used social media platforms and the Walden University participant pool to recruit participants for this research. I posted an invitation on these sites about my study, inviting interested participants who met the study criteria to email me if they are interested. After potential participants contacted me, I confirmed that they met the study criteria and emailed those participants who met the criteria a consent form.

Instrumentation

I used a semistructured one-on-one interview to collect data (see Appendix B). The recorded interviews were the only data source in this study. In this section, I explain the instrumentation I used to collect the data. This section is essential for clearly understanding how the researcher gathered and analyzed data in their study. This section includes the interview guide for collecting data through semistructured interviews and describes the method of recruitment and participation. The semistructured interview guide allowed for open dialogue and two-way communication during the interview process. I also provided the participants with a copy of the interview questions before the interview to allow them to review the questions and prepare (see Yin, 2014).

Semistructured Interview Guide Overview and Description

To collect data, I followed an interview guide, a structured yet open-ended format that allows participants to express their ideas and perspectives on the phenomenon under study (Percy et al., 2015; Roberts, 2020). The researcher-created semistructured interview

guide included a specific outline and pre-planned questions to gather data in a specific and efficient manner (see Brinkmann, 2020). The interview guide consisted of 10 questions, pre-planned and probing items, and items related to the conceptual framework and key terms. The interview protocol was composed of open-ended questions, which yield robust, detailed responses instead of low rigor, “yes” or “no” questions (see Fajari, 2021).

I started the interview with general and introductory questions so the participants can ease into sharing experiences regarding teaching students with learning loss and recovery. I designed additional questions with more focus, guidance, and details. I thought about my participants' time regarding the interview taking too long to gather information; therefore, I avoided interviewing participants for more than an hour.

Basis for Instrument Development

I constructed the semistructured interview based on the purpose of the study, research questions, and literature review. A well-developed interview guide that yields data with detailed descriptions requires careful planning of the introductory, transition, key, and closing questions (Castillo-Montoya, 2016). To successfully contribute to the body of knowledge on this phenomenon, I conducted an extensive literature review for the broader concepts and the conceptual framework in Chapters 1 and 2 to guide the interview questions. I ensured that the study design and the questions were well thought out and reflective of the literature review. The interview questions for this study focused on the practices used to address learning loss among students during the COVID-19 pandemic (see Appendix B).

Establishing Content Validity & Sufficiency

Content validity in qualitative research is defined as how accurately a method measure what it has been deployed to measure (Brod et al., 2009). The semistructured interview guide measured the experiences mathematics teachers encountered with student mathematics learning loss recovery. The items on the guide collectively measured the construct of *teachers' experiences with students' learning loss recovery*. The interview guide was sufficient because I included questions allowing the interviewee to share their background, experiences of learning loss recovery, and experiences of mathematics curriculum use.

Then, I guided my interview questions on this topic. Before writing the first question, I had to become more familiar with research literature about learning loss recovery. Knowing what other researchers found guided me in developing questions rooted in the literature. I used a script during each interview. The interview guide content accuracy was confirmed through expert review and pilot interviews, ensuring respondents understood the material and the intended questions, ensuring validity and reliability (see Clark et al., 2020). In this section, I discuss how I established content validity and sufficiency.

Expert Review. To enhance content validity, the interview guide was designed using qualitative research sources and prior research (see Allensworth & Schwartz, 2020; Hanover, 2020, 2021; Morton & Hashim, 2023) and reviewed by my dissertation committee (see Rubin & Rubin, 2012). I made multiple submissions of the interview questions to my committee members. After each review, I eliminated, added, or revised

the interview questions based on their feedback. For example, my committee member suggested that I added more probing questions to receive more data from the interviewee.

Pilot Interviews. I also piloted the interview guide using two teachers who met the study criteria, except they were not TPS teachers. These data were not used as part of the study. The pilot interview was a valuable experience for me, providing insights into using interview instruments for qualitative research studies. I used the pilot interview to check for understanding and clarity and ensure my questions made sense (see Clark et al., 2020). Piloting the interview guide allowed me to determine the order of the questions and get a realistic sense of how long the interview would take and whether participants could answer the questions (see Clark et al., 2020; Merriam & Tisdell, 2016).

After the pilot interviews, I reflected on the experience but did not need to make any changes to the interview questions. I learned several actionable strategies through the pilot interview, including the use of probing techniques and open-ended questions. Using the Zoom platform to record the interview for the first time, I also recorded the interview using another recorder as a backup system. The first interview lasted 45 minutes, and the second interview lasted 47 minutes. Both interviewees provided rich information about their students, administrations, and roles before, during, and after the pandemic. However, two young children interrupted the second pilot interviewee, which caused confusion. I reassured the interviewee to take as much time as needed to rectify this error and tried to redirect the interview questions. This strategy worked initially, but then I lost focus on which question I asked. I planned to use color markers to maintain concentration throughout the interview and mark on a hard copy of the interview guide where I left off.

In conclusion, the pilot interviews provided valuable insights into the use of interview tools and the importance of maintaining a clear and focused conversation during interviews.

Alignment. Table 3 included the alignment of the semistructured interview guide items to the framework and research question elements. Interview Questions 3-9 align with the conceptual framework components. Interview Questions 2–9 align with RQ1, and Interview Questions 7–9 align with RQ2.

Table 3

Alignment of Semistructured Interview Guide Items with the Research Questions, Framework, and Constructs

Item	Framework				Research Question			
					1			2
					Instructional	Level		
	1	2	3	4	Practices	Teacher	School/District	Support
1	Background							
2					X	X		
3	X	X	X	X	X		X	
4	X	X	X	X	X	X		
5	X				X	X	X	
6		X			X	X	X	
7				X			X	X
8				X			X	X
9				X			X	X
10	Closing							

Note. 1 = Opportunities for additional learning time, 2 =Assessment, 3 = Student social and psychological wellness, 4 = Support for teachers.

Sufficiency. The semistructured interview was an appropriate and sufficient method for answering the research questions of this study. The interview guide allowed for the collection of in-depth and rich data from a sample of 10 Grade 3–5 mathematics teachers on specific instructional practices and support needs related to addressing the learning loss of students during the COVID-19 pandemic. The open-ended nature of the interview guide allowed for the in-depth exploration of the participants' perspectives and experiences (Castillo-Montoya, 2016), which was crucial for understanding the complex phenomenon of addressing learning loss during remote learning. Additionally, by using semistructured interviews I ensured the data were collected systematically and efficiently to provide a comprehensive understanding of teachers' experiences, thus ensuring that the research questions were fully answered.

Procedures for Recruitment, Participation, and Data Collection

This section includes an explanation of how I recruited participants in this study and the process of providing informed consent. I also discuss how I collected the interview data and how participants exited the study.

Recruitment Process

I invited participants to participate in the study via social media. I posted an invitation on Facebook sites asking for participants. Interested participants emailed me. Once I determined that the participant met the study criteria, I emailed them the informed consent form and scheduled the interview.

Informed Consent

The informed consent form outlining the study's goals and methods ensured that I respected participants' rights. I assured the participants in the form that their personal information would be kept private and that they were free to withdraw from the study without repercussions. In the email, I described the study, including any risks and benefits those participants might be exposed to during the study. I instructed the participants to respond to the email with 3 days of receipt, if they agreed to participate. Participants consented through an email by responding "I agree" or "I consent" statement.

Interview Data Collection Events

The interviews took place in person or through Zoom for approximately 35–45 minutes and were audio recorded with participant consent. During the interview, I remained focused and attentive to ask questions and provided participant feedback that was pertinent to the study as the participants described their experiences of the qualitative data process. I encouraged the participants to sit in a quiet room and turn off their cellular phones to avoid distractions. I informed the participants that the interviews would be transcribed and that I would email them a summary of the interview.

I used a semistructured interview guide to ensure that all questions were asked similarly to all research study participants. Before starting each interview, I reminded the participants of the study's purpose and the interview process. I asked one question at a time. If a participant gave a response to a question that also answered the following question, I repeated the question to ensure this was the participant's answer. I kept the

interviews on the topic to ensure all participants' responses, especially those related to the research questions. I provided clarification and additional probing if necessary.

Recording and Tracking Interview Data

I recorded all interviews using Zoom or an audio recorder. I used a notebook to record the participants' information, interview dates, and the length of each interview (see Lodico et al., 2010). During the interview, I also recorded body language and nonverbal cues in my notebook. For participant privacy, I used an alphanumeric code to identify the participant's interview (e.g., Participant 1, Participant 2).

I used Zoom's built-in automatic transcription feature to transcribe each interview. Transcripts allow researchers to capture original, nuanced responses from sample respondents (McMullin, 2023). I was able to obtain the participants' responses naturally using their own words—not a summarized version. I also returned the original transcript to each participant to see what the interview said and gain new context as the researcher. The editable digital transcript files are effortless to work with, saving the researcher time to ensure findings as the interviewer (Kobakhidze et al., 2021).

Participant Exit and Follow-Up Procedures

I thanked each participant for participation immediately following the interview. Through email, I provided each participant an opportunity to check the accuracy of the interview after I transcribed each interview. I changed and addressed any additional responses from the participants.

Data Analysis Plan

I followed this outlined analysis plan to analyze the interview data I gathered in this study. In this section, I discuss how the data were connected to the research questions, the type of and procedure for coding, the data management software that I used, and how I prepared the data for analysis. I also provide in detail the coding process and procedures. I end the section with how I handled any discrepant data.

Connection of Data to Research Questions

The research questions direct the researcher to specific data collection strategies. I gathered semistructured interview data for this research. The data collection strategy was to use an in-depth interview. Qualitative researchers obtain their data meaningfully by designing the right tools that reflect the research objectives (Creswell & Creswell, 2018; Creswell & Poth, 2018). To meet this standard, I aligned the interview questions with the RQs. Interview Questions 2–6 addressed RQ1 about instructional practices used to instruct Grade 3–5 students struggling in mathematics. Interview Questions 7–9 aligned with RQ2 about the support TPS teachers needed to improve the mathematics achievement of Grade 3–5 students after a year of remote learning. Question 1 was a background question; Question 10 was open-ended so the participant could add any additional information.

Preparing the Data for Analysis

I used Zoom's built-in automatic transcription feature to transcribe the audio recordings from the individual interviews. Zoom provided a downloadable text file of each interview that I then uploaded into Microsoft Word to prepare the data for high-

quality analysis. At the simplest level, a code for data analysis is a label that describes the content of a piece of text. The text was analyzed by deducting coding that starts with pre-established codes applied to the data set (i.e., a set of interview transcripts). These steps were useful because the research study must allow for duplication from others. I ensured the accuracy of the transcripts by examining them.

Furthermore, I removed filler words by applying the following guidelines. I aligned the data with important themes as I completed these steps. I positioned and connected the categories. I recorded notes by analyzing each word to describe practices, strategies, and supports. These notes were useful because they allowed me to recall information. Finally, I performed a deep analysis of the data segments.

Type of and Procedure for Coding

Tracking the data from an interview guide allowed me to read the transcripts for a clear and precise understanding. It was simpler to comprehend comments from transcripts after coding qualitative data. Assigning codes to words and phrases makes it easier to analyze and summarize the data collection (Cascio et al., 2019). I considered a priori, open, and axial coding to code the data. When the research develops, the code beforehand is called priori coding; they are predetermined. A priori codes are codes developed before examining the current data (Rogers, 2023). Many qualitative researchers like to develop the codes as they code the data. These codes are called inductive codes. *Inductive codes* are codes developed by the researcher by directly examining the data. However, in open coding, as the name suggests, a researcher creates codes during data analysis. They are not predetermined. Open coding is the first step, where textural data are broken up into

discrete parts and then coded and labeled (Cascio et al., 2019). Axial coding occurs when connections are drawn between the codes, and codes are grouped into categories (Cascio et al., 2019). These group codes become axes that tie the code together.

I began the coding process using priori coding based on this study's framework and the following terms: A priori codes are codes developed before examining the current data (Rogers, 2023). Many qualitative researchers like to develop the codes as they code the data (Rogers, 2023). Rogers (2023) discussed present data, a priori codes, and codes for data analysis. These codes are called inductive codes. Inductive codes are codes developed by the researcher by directly examining the data. I created additional codes through the a priori coding process, which I then reduced by applying open coding to the a priori codes. I returned to the raw data from each source to ensure I had not missed any repetitions. During the last axial coding stage, I searched the open codes and corresponding excerpts from interviews to identify the relationships among the open codes. I grouped similar open codes and assigned a code to each category. As I included examples of how I formed categories from the open codes, I recorded the process in my research journal. After I maximized the categories with axial coding, I shared the entire coding process in my data results narrative.

Type of Analysis

I employed thematic analysis to analyze the qualitative data collected in this study. Thematic analysis, as outlined by Clarke and Braun (2013), is a rigorous and systematic process that goes beyond counting the occurrences of a particular word, phrase, or concept and aims to link results to their context. I analyzed the data for this

study using an inductive approach to thematic analysis, as Thomas (2006) outlined. This approach involves carefully re-reading the transcripts, line-by-line, and identifying relevant words, phrases, and sentences. I then developed codes to capture the key themes and patterns that emerged from the data. I conducted this process by reviewing the transcripts and listing significant statements. I used thematic analysis to carefully examine the data to identify recurring themes, topics, ideas, and meaning patterns.

Most researchers identify six steps in thematic analysis: familiarization, coding, theme generation, theme review, theme definition, naming, and writing up (Terry & Hayfield, 2021). If you follow this process, the researcher should avoid confirmation bias when conducting your analysis. Clarke et al. (2015) developed this method for psychological research. Thematic analysis is a versatile and iterative method for analyzing qualitative data to gain insight into people's thoughts, beliefs, and experiences. It must be used carefully to ensure accuracy without distortion.

The first step in thematic analysis was to familiarize myself with the collected data by observing the data as a whole and taking notes of my first impression (Braun & Clarke, 2021). To take notes and transcriptions from online interviews to learn the material, jot down code ideas, and use notes and memos is a form of familiarization (Kuckartz & Rädiker, 2019; Lewins & Silver, 2014; Mezmir, 2020). I used a software coding application to code the data, which is the second step of thematic analysis. The codes were chosen based on the data's meaning and the study's goals. After I created codes, I examined them, identified patterns within the codes, and started generating multiple codes into a single theme (Step 3). The themes finding shared concepts across

codes in an iterative process. Identifying and defining themes was the fourth step. Once I had a clear idea of what each theme meant and how the theme interpreted the data, I gave each theme a basic name (Step 5). I created theme statements that accurately bridge the categories of the coding process. The final step (Step 6) was writing the research report. For purposes of this study, I present the findings in Chapter 4 and discuss their significance and implications in Chapter 5.

Data Management Software

When employing software for qualitative research, data management is crucial to maintaining accuracy and participant privacy (Kuckartz & Rädiker, 2019; Lewins & Silver, 2014). I employed MAXQDA to analyze the interview data for this basic qualitative research study. MAXQDA is a well-known program for qualitative and mixed-methods data analysis. This software can be used to analyze texts, images, audio/video files, webpages, tweets, focus group discussions, and survey responses. MAXQDA is robust, user-friendly, inventive, and intuitive and works on Windows and Mac (Kuckartz & Rädiker, 2019). I also used Excel to organize the data and preliminary analysis.

Treatment of Discrepant Cases

I employed an approach for treating discrepant cases to ensure the robustness and validity of the findings. Beltrama (2022) defined *discrepant cases* as instances in which data deviate from the patterns and themes identified through analysis. If such cases arise during the data analysis process, I thoroughly examined and reported these cases in the same manner as data that were not considered discrepant. I treated these cases as

disconfirming evidence, providing additional validation for the results of this study (Maxwell, 2008).

Trustworthiness

To be trusted, qualitative researchers must show that the data analysis was done precisely, consistently, and thoroughly (Stahl & King, 2020). I, the researcher, ensured that the data were trustworthy by recording, systematizing, and revealing the analysis methods in enough detail for the reader to decide if the process was reliable for this research study. I employed several steps to ensure the data analysis's credibility, transferability, dependability, member checking, and confirmability.

Credibility

The true value of qualitative research is measured by its credibility, which is the credibility of qualitative research indicates the reliability of the study's findings. The reliability of the results depends, in part, on the expertise of the researchers and the soundness of their methods (Shufutinsky, 2020). Shufutinsky (2020) emphasized the importance of qualitative research's credibility and validity, as well as researcher experience, in ensuring the reliability of findings. The researcher strives to demonstrate their credibility as a source by being free of bias (Morgan, 2022). I explained the methods used in this research study to demonstrate the data analysis's precision, consistency, and thoroughness. Using first-hand evidence in the form of interview samples adds to the credibility of the findings. I employed member checking, data saturation, and reflexivity techniques. Credibility relates to the researcher's confidence that they have been transparent and truthful about the data, findings, and interpretations (Yin, 2014, 2016).

Member checking, also known as respondent validation, is a method used to check the reliability of a sample's members (Candela, 2019). Member checking involves using the data or results to verify accuracy and ensure a good fit with the study's goals (Creswell & Creswell, 2018; Creswell & Poth, 2018). Qualitative studies can be improved through member checking, which can be done either during the interview process or at the end of the study (Thomas, 2017). The objective of using member checks is to establish trust with the interviewee and verify the accuracy of the information (McGrath et al., 2019). Participants could think critically about the data and give feedback on whether they think the summaries were a good representation of their thoughts, feelings, and experiences. These checks helped reduce the occurrence of erroneous data and the erroneous interpretation of data within the membership. This procedure aimed to produce genuine, unique, and trustworthy results.

Data saturation involves collecting and analyzing data until no new information emerges (Barrett et al., 2020). At that point, the researcher is confident that they thoroughly understood the phenomenon under investigation. Reflexivity involves reflecting on biases, assumptions, and values that may have influenced the research to be aware of the potential impact the experiences and biases may have on the findings (Fusch & Ness, 2015). To accomplish reflexivity, I took notes on participants' comments and my thoughts during the interview, made memos of the interviews as soon as possible after their completion, and continually edited my researcher subjectivity statement. I collected interview data from all participants using the researcher-created interview guide (see Appendix B) to establish credibility. The interview guide was composed of open-ended

questions, which yielded robust, detailed responses instead of low rigor, “yes” or “no” questions. The interview guide content was confirmed through expert review and pilot interviews to enhance credibility.

Transferability

The transferability of the findings refers to the extent to which a research finding can be applied in other contexts and studies (Malterud, 2001; Patton, 2015). As described by Creswell and Miller (2010), transferability pertains to the researcher communicating the methodology, the participant experience, and the phenomenon with clarity and much detail. The transferability of qualitative study findings depended on detailed descriptions of how the study was carried out and the ability to be replicated in a different environment (Maxwell, 2021). To accomplish transferability, I used thick descriptions. Thick descriptions are a research methodology used in social sciences, particularly anthropology, to understand and interpret the meaning of cultural practices and symbols (Geertz, 1973; Sorrells, 2020). It involves a detailed and context-rich description of social phenomena, emphasizing the studied phenomenon’s historical, cultural, and subjective aspects. Thick descriptions aim to reveal the underlying social and cultural meanings and values that shape human behavior and experiences.

A transparent methodology provides an enhanced sense of transferability, making it relatively easy to duplicate the study and obtain similar results (Creswell & Creswell, 2018). I gave thick descriptions by taking notes during the interviews that describe the full context, including the physical/virtual setting of the Zoom calls or in-person setting and the emotional context:

- I provided rich descriptive details of the setting so the reader can feel as if they are present.
- My notes and descriptions accounted for emotions and emotional responses from myself and my participants. For example, since a pause may indicate surprise, shock, thought, or uncertainty, I explained the emotional impetus for the delay, so the reader understands its importance.
- That leads to the final way I presented thick descriptions, assigning motivations and intentions for emotions and actions.

Dependability

In qualitative research, dependability assures the study's replicability "if the inquiry occurred within the same cohort of participants, coders, and context" (Forero et al., 2018, p. 3). I maintained the study's dependability through a rich and consistently described research method where all steps were documented in detail. Additionally, any changes made to the interview were confirmed and justified. Research studies must ensure the reliability of the results, as they could be relied on. Researchers must ensure that any inaccuracies or omissions in the research study or the researcher's final report are identified. Establishing dependability and the potential for replicability is essential for a reliable research study (Sandbergh, 1997). Dependability relates to how researchers expect similar findings regardless of the participants. I conducted an audit trail to ensure the results were consistent over time. An audit trail is a sequential record of all the activities a researcher takes to show that the data are truthful based on experience provided by the participants.

To be transparent about a process, one must provide a detailed account to show how the data were collected, coded, assigned themes, and analyzed (Creswell & Creswell, 2018). The questions were the same for each of the 12 semistructured qualitative interviews. The location of the semistructured interviews used the Zoom platform previously described in the research plan, detailed in Chapter 3. I provided a detailed description of the research methods used. I repeated the research study step by step to identify similarities in results or to improve the findings.

Confirmability

The researcher must prove that they have been trustworthy in reporting the data specifically based on the dialogue and words used by the participants (Creswell & Creswell, 2018). Confirmability points to the idea of objectivity. I implemented an audit trail to assess the confirmability of the data by ensuring that I did not make careless errors in conceptualizing the study, collecting data, interpreting the findings, or reporting the results (see Cutcliffe & McKenna, 2004). I maintained detailed records of all steps taken during the research process, including notes and transcripts of the interviews, available to other researchers, to complete member checking. Keeping detailed records allows other researchers to evaluate the research process and the findings and provide a means for replicating the study—the confirmability of all results and document keeping kept in a secure location. In addition, the role of the researcher is to keep detailed records of how data were collected to increase the likelihood of another researcher duplicating the research process with the same consistency.

Ethical Procedures

Qualitative researchers have the potential to explore ethical practices, as people from marginalized groups may not be able to express themselves well due to the in-depth nature of the data collection technique. It is the responsibility of researchers to uphold the principles of benevolence, honesty, and integrity while respecting the rights of participants in the study by respecting their right to privacy and confidentiality (see Shaw, 2023).

Institutional Permissions

To ensure compliance with ethical guidelines in the study, I obtained authorization from Walden University's IRB (Approval No. 0084980) The Walden University participant pool and social media to recruit participants. Participant collaboration was essential for a reliable, ethical study (Walden University, 2023). The IRB reviews research studies to ensure they comply with applicable regulations, meet commonly accepted ethical standards, follow institutional policies, and adequately protect research participants (Amdur & Bankert, 2007; Babb, 2020; Rivera, 2022).

Ethical Concerns Related to Recruitment Materials and Processes

I emailed the consent form to the participants outlining the study's privacy, ethics, risks, and benefits to address ethical concerns related to recruitment materials. Risks to participants included a one-hour time investment and potential emotional responses to interview questions. Participation was voluntary; they could withdraw at any time, and I told them that their personal information would be kept confidential. All participants gave consent through an emailed "I agree" or "I consent" statement before interviews.

Ethical Concerns Related to Data Collection

The data were collected from teachers who met the study criteria from the Walden University participant pool and social media. I scheduled and conducted the interviews using Zoom video conferencing and transmitted the transcripts for member checking. Teachers were assigned alphanumeric codes for all their data to protect participant privacy. I addressed any ethical issues that may arise during the research process. I scheduled sufficient interviews with instructors to minimize the likelihood of ethical problems.

Treatment of Data

I kept participants' data confidential to ensure that recorded interviews are secure. I adhered to the data handling and storage guidelines of Walden University. To ensure the protection and confidentiality of participant's personal information, I took measures to safeguard the data collected during the study. Beyond the data analysis phase, I kept no personally identifiable data linking the participants to the alphanumeric codes. All email interactions with participants were password-protected. I saved electronic audio recordings, transcripts, codes, and other data on a password-protected computer and USB drive. All data are securely secured in a locked safe within my home. After the research study, I will store the data for 5 years before shredding and discarding the data per Walden University's guidelines and wiping and reformatting the USB drive. I did not publish, record, or transcribe personally identifiable participant information. I ensured that all participants' identities were hidden.

Summary

The methodology I used to conduct my qualitative research study was described in detail in Chapter 3. Participants were third- through fifth-grade math teachers who taught during and after the COVID-19 pandemic. The 10 third to fifth-grade teachers had at least 3 years of experience teaching mathematics. In this chapter I described my role as a researcher, the participant selection criteria, instrumentation, participant recruitment, data collection, and data analysis strategy. I also shared my plan to conduct an interview with 10 mathematics teachers to learn about their practices, strategies, and needed support. I also shared my plan to maintain trustworthiness by conducting the data analysis precisely, consistently, and exhaustively. I also shared my plans to follow ethical guidelines in the research study.

In Chapter 4, I describe the study's results and findings. The lived experiences and thoughts of the Grade 3 to 5 mathematics teachers shared during the interview. Then, their data are organized around the research questions. Chapter 5 includes the findings with the final interpretations of the data, the social implications, and my recommendation for future research.

Chapter 4 Results

The purpose of this basic qualitative study was to explore TPS Grades 3-5 mathematics teachers' instructional practices and the support needed to improve students' pandemic-related learning loss. I explored the experiences of TPS Grade 3–5 mathematics teachers before, during, and after COVID-19 through a qualitative analysis of interview responses. I was motivated to conduct this research to gain a deeper understanding of how elementary mathematics teachers receive resources and support from their schools and administrators in relation to learning loss and recovery due to COVID-19. The following are the research questions that I used to guide the study:

RQ1: What instructional practices do TPS Grade 3–5 mathematics teachers use to address student learning loss?

RQ2: What supports do TPS Grade 3–5 mathematics teachers need to address student learning loss?

Chapter 4 begins with a description of the study setting, including participant demographics. Next, I explain the data collection process and describe how the data were analyzed. The next section is the results, followed by the evidence of trustworthiness. Chapter 4 concludes with a summary of the findings gathered by analyzing the data collected during the study.

Setting

At the time of the data collection in TPS, there were no personal or organizational conditions that influenced the 10 participants that might affect the interpretation of the study results. The 10 elementary mathematics teachers were all located within TPS,

which is known for its diverse student population and significant educational initiatives. Their experience ranged from 4 to 29 years of teaching in TPS. All the teachers were African American, except for one European American teacher. There were seven female teachers and three male teachers.

All participants were certified to teach elementary mathematics with at least 3 years of experience instructing elementary third-, fourth-, or fifth-grade mathematics students before, during, and after COVID-19. At the time of this study, six of the teachers also taught mathematics in grade levels above the fifth grade in TPS. Two of the participants started in the corporate world and later received credentials to become certified mathematics and science teachers through a bachelor's degree program; four participants also received their teaching certificates as part of their bachelor's degree program; and the remaining four participants received their certification to teach through an alternative certification program. See Table 4 for demographic information.

Table 4

Demographics of Participants

Participant	Gender	Ethnicity		Years teaching	Grade level	Subjects taught
		African American	European American			
1	F	X		18	3-7	EM/General
2	F	X		20+	4-5	EM
3	F	X		4	4	EM
4	M	X		6	3-5	EM
5	F		X	20+	4-7	EM
6	F	X		3	5-12	EM/Special
7	M	X		5	4-6	EM
8	M	X		12	3-7	EM
9	F	X		5	5-7	EM
10	F	X		20+	5-8	EM/Special
Total		9	1			

Note. F = female, M = male, EM = elementary mathematics, EM/Special = elementary mathematics and special education.

Data Collection

The data collection phase of this study commenced on February 29, 2024, immediately after receiving IRB approval (# 02-29-24-0084980) and concluded on May 21, 2024. To maintain confidentiality, I gave each participant an alphanumeric code (e.g., Participant 1, 2), also used in the descriptions. I conducted each interview via Zoom and allowed each participant to choose the time and day. I arranged the interviews at the most convenient times throughout the day to accommodate participants' schedules. All

interviews were audio recorded and transcribed using Zoom's built-in automatic transcription feature.

Recruitment Process and Timeline

Each participant met specific selection criteria to ensure that the data collected were relevant and representative of the experiences of elementary mathematics teachers during the COVID-19 pandemic. I used the following criteria to select participants:

- Age**:** Participants had to be 18 years or older to ensure that they were legally able to provide informed consent for their participation in the study.
- Teaching Position**:** Participants were required to be third-, fourth-, or fifth-grade teachers who taught mathematics in TPS during and after the COVID-19 pandemic. This focus on specific grade levels allowed for a targeted examination of instructional practices and challenges in elementary mathematics education.
- Teaching Experience**:** Participants needed to have at least 3 years of experience teaching mathematics. This criterion was established to ensure that participants had sufficient experience in the classroom to provide informed insights into the instructional practices and support needed for addressing learning loss.

I designed these inclusion criteria to select a diverse group of participants who could provide valuable perspectives on the challenges and strategies related to learning loss recovery in elementary mathematics education. By adhering to these criteria, the study aimed to gather rich, relevant data that could inform future practices and policies in educational settings.

The recruitment process involved several steps. Initially, I emailed an invitation flyer to potential candidates and shared it on social media. During the first 2 weeks, three mathematics teachers responded, followed by three additional responses in the next 2 weeks and four more in the subsequent 2 weeks. I scheduled the interview appointments at convenient times for the participants, each of whom received a calendar invitation containing a Zoom conferencing link and a private password. Additionally, I sent participants reminders regarding the exact date and time of their scheduled interviews. Table 5 presents the interview data log for each participant. Over a 6-week period, I received 10 responses, with three responses by Weeks 2 and 4, and four additional responses by Week 6

Table 5

Participant Interview Information

Participant	2024 Interview Date	Audio Number
1	March 22	12239850
2	March 25	1722002687
3	April 6	1052820803
4	April 8	1786702431
5	April 9	2388960345
6	April 17	1218804754
7	May 3	1085500750
8	May 10	1996646148
9	May 15	1046265434
10	May 21	1452077204

Challenges and Adaptations

Spring break caused delays in the data collection process, necessitating additional recruitment efforts after the break. I also encountered computer issues, which contributed to delays in data collection. I lost two audio recordings before they could be transcribed.

After taking my computer for technical support, I learned that there was a virus on my computer, and the audio files could not be retrieved. I could not go back to these participants again for a second interview. I found two other participants who met the study criteria.

Participant Overview and Interview Procedure

I collected a total of 12 participant interviews for this study, although I discarded two due to corrupted audio files. All participants were mathematics teachers from Grades 3, 4, or 5 and employed in TPS. I conducted all interviews via Zoom video conferencing software. Interviews lasted between 45 to 60 minutes.

Recording and Transcription

Before each interview, I tested the recording device to ensure proper capture of the conversation. I served as the primary instrument for data collection, using a semistructured interview protocol. Interviews were audio recorded using Zoom's built-in recording feature and transcribed using the built-in transcription feature. I saved audio recordings in a file folder on a personal password-protected computer. I accessed the Zoom cloud recordings, located the meeting transcript, and downloaded it as a text file. Then, I opened the file in Microsoft Word, where I could either copy and paste the content or use the Open Other Documents function to import the file directly.

Review Process, Quality Assurance, Data Security, and Retention

I reviewed and shared the transcriptions with participants within 7 days of the interview for accuracy and verification. I instructed the participants to verify accuracy by responding with "it is accurate" or "revisions needed." All digital files were stored on a

password-protected computer. As per university requirements, I will retain all data for 5 years after the study's conclusion. Then, I will destroy the data.

Adherence to Protocol

During the data collection process, I meticulously followed all procedures outlined in Chapter 3, ensuring that I executed each step as planned. This adherence to protocol not only maintained the integrity of the data collected but also reinforced the reliability of the overall research methodology. By sticking to the established guidelines, I was able to minimize potential errors and enhance the validity of the findings.

Data Analysis

The data analysis process was systematic and iterative, involving several stages to ensure a thorough examination of the collected data. I coded the data using Excel and qualitative software MAXQDA. I took the following steps in the research process. First, data preparation involved reading the transcribed interviews carefully and repeatedly to gain familiarity with the data and an overall understanding of each interview. Next, I conducted individual analysis, where each participant's data was analyzed separately before moving on to the next transcript. This approach allowed for the identification of unique codes within each interview.

I employed three types of coding: a priori coding, open coding, and axial coding. I used Microsoft Excel as the primary tool for organizing and conducting a preliminary analysis of the data to facilitate the data organization. I pasted each interview into a single Excel sheet, and I created separate tabs for each of the two research questions, pasting the relevant participant responses. I structured the Excel spreadsheet to support the analytical

process of determining codes, categories, and themes. To align with the research questions, I divided the interview questions into two separate tabs in the Excel spreadsheet: Questions 2–6 related to RQ1 and Questions 7–9 related to RQ2. For data input and coding, I entered each participant's response into the appropriate Excel tab along with the corresponding question number from the interview guide. I created additional columns for inputting priori, open, and axial codes for each response.

In addition to manually coding the data, I uploaded the transcripts into the MAXQDA software to help generate a list of codes and related quotes. I used MAXQDA 24 for additional coding. I uploaded the transcripts into the software and added the codes created from the manual coding in Excel to the MAXQDA project. After re-reading the transcripts, I applied the existing codes and added new ones, confirming that the manual coding aligned with the software-generated coding.

From the open and axial codes, I developed themes, and MAXQDA allowed me to print out the codes with relevant quotes. This structured approach to data analysis ensured a comprehensive examination of the collected data, allowing for the identification of patterns, themes, and insights relevant to the research questions. The use of multiple coding methods (priori, open, and axial), and manual and software coding provided a robust framework for interpreting the data and deriving meaningful conclusions. My data collection process is aligned with the procedures outlined in Chapter 3.

A Priori Coding

I began the coding process using a priori coding based on this study's framework. The concepts of learning loss recovery comprised a priori codes. During the coding process, I logged the code, source, participant identifier, and excerpts from the data sources. The a priori codes I derived were as follows: *learning loss recovery*, *assessment*, *opportunity for additional learning time*, *student social and psychological wellness,* and *support for teachers.* Table 6 includes the a priori codes along with examples.

Table 6

A Priori Codes From Interviews With Examples

A priori code	Participant	Excerpt
O	P10	"Of course, there's been after-school and Saturday school tutoring. They also offer boot camps for a variety of subjects, including math and science, among others. Of course, the majority of the attention is on reading and math, but I believe we should allocate the same amount of time to these other subjects as well, given their overlap."
A	P1	"The formative assessment bears a closer resemblance to our exit tickets. Like how we teach a concept. We expect to see growth within the class. You get your exit ticket. It is a very short statement with at most four questions. Students should respond to at least half of the questions. We can conclude that they have a solid understanding of the topic. "
W	P10	"She acknowledged that, and you know, will correct the behavior, but her concern to me was, I get tons of text messages about his behavior, but no one has texted me about his academics. Is he going to pass to the next grade? Now, that's saddened me. It is May we're out of school in the next week, and this parent wants to know if her kid is going to pass it. Why is it that she doesn't know that already? You understand what I'm saying? So. So that, to me, is a lack of communication. I don't know if that's the teachers."
S	P4	"The school district was supportive, as they offer a lot of professional development on that Eureka Math curriculum. And when I say that I mean they offer workshops. They provide in-person Eureka coaches to visit classrooms. Additionally, the district instructional coach is available to provide additional support. Within the building, your immediate team is available."

Notes. O = opportunities for additional learning time, A = assessment, W = student social and psychological wellness, S = support for teachers

Open Coding

I created additional codes through open coding. I searched the data for similarities and labeled groups of words with a term that provided meaning to the word group. In my data results, I provided examples of labels I applied and the process of combining,

reducing, or adding new labels in the open coding stage. I generated a total of 66 open codes. For example, four open codes I identified were *diagnostic assessment*, *differentiated instruction*, *it takes a village*, and *parental accountability*. Table 7 includes examples of the open codes with examples.

Table 7

Open Codes by Source With Examples

Open codes	Participant	Excerpt
Diagnostic assessment	P4	"First, I'd like to start off with some type of baseline assessment just so I can gauge what my students are. I actually just give them work or problems that they should have learned at the end of the third-grade year before they come to fourth grade, just so I can see where they are, and then I will go from there."
Differentiated instruction	P3	"I can never say this word differentiated learning. I did do that in the classroom. I work in a lot of small groups because I have to meet the needs I have. I have a good amount of space to get to my class, so I do a lot of small groups. I use a teaching method that's called I do. I do. We do? You do. So, I teach them, and then we. They do it together, and then they have independent time to learn the material. I use a lot of initiatives. Those I like go to because students, I feel like students learn best when their hands are on with things."
It takes a village	P6	"Uhm. Support that I need, I think, and ultimately, I think we need a team or village like so yes, the teachers can do it here, but we need to know that it's also being taught across the board like parents are helping. And even if we have a tutoring place that we're all communicating and kind of working together to know what goals we need to reach for that. Students and just ultimately like having everybody on board."
Parental accountability	P7	"For me, it's just accountability, holding themselves accountable and their parents holding them accountable as well. So, like that. Today's parents kind of dropped the ball."

Axial Coding

During the axial coding stage, I searched the open codes and corresponding excerpts from the interviews to identify the relationships among the open codes. I grouped similar open codes and assigned codes to each category. Table 8 shows the 12 axial codes that I generated from the open-coded categories.

Table 8

Number of Open Codes That Informed Each Axial Code

Open codes *(n)*	Axial codes
4	Computer or technology-assisted
3	Differentiated instruction
1	Manipulatives
11	Other practices
8	Barriers to remediating learning loss
3	Formative assessment
4	Testing issues
7	Opportunities for additional learning time
9	Positive support
5	Limited or ineffective support
6	Overall support needed by teachers
5	Support needed by teachers for student psychological & social wellness
Total 66	

Thematic Analysis

My next step was to evaluate the axial codes for the themes they represented. After I identified the themes that emerged from the study, I validated that the themes were aligned with the coding and informed the RQ in this study. Four themes emerged from the interviews conducted to explore TPS Grades 3–5 mathematics teachers' instructional practices used and support needed to improve students' pandemic-related learning loss:

- Theme 1: TPS Grade 3–5 mathematics teachers indicated that they used evidenced-based instructional practices to help students overcome COVID-19 learning loss, although they were sometimes ineffective.
- Theme 2: TPS Grade 3–5 mathematics teachers indicated that formative assessment and creating opportunities for additional learning time were essential to learning loss recovery.
- Theme 3: TPS Grade 3–5 mathematics teachers indicated they received positive support from school and district administrators during and after COVID-19, although the support was sometimes ineffective.
- Theme 4: TPS Grade 3–5 mathematics teachers indicated that now that they are back in the classroom, they need professional development and resources tailored to the specific needs of addressing learning loss recovery in mathematics.

Each theme is supported by evidence from the interviews.

Table 9 displays how a priori, open, and axial coding informed each theme and research question.

Table 9

A Priori, Open, and Axial Codes That Informed Each Theme by Research Question

A Priori Codes	Open Codes *n*	Axial Codes	Themes 1-4
			TPS Grade 3–5 mathematics teachers indicated that …
RQ1: Instructional practices used to address learning loss			
	4	Computer or technology-assisted learning	1. They used evidence-based instructional practices to help students overcome COVID-19 learning loss, although they were sometimes ineffective.
	3	Differentiated instruction	
	1	Manipulatives	
	11	Other practices	
	8	Barriers to remediating learning loss	
Assessment	3	Formative assessment	2. Formative assessment and creating opportunities for additional learning time were essential to learning loss recovery.
	4	Testing issues	
Opportunities for additional learning time	7	Opportunities for additional learning time	
RQ2: Supports needed to address learning loss			
Support for teachers	9	Positive support	3. They received positive support from school and district administrators during and after COVID-19; however, the support was sometimes ineffective.
	5	Limited/ineffective support	
Support for teachers	6	Overall support needed by teachers	4. They need professional development and resources tailored to the specific needs of addressing learning loss recovery in mathematics
Student social and psychological wellness	5	Support needed by teachers for student psychological and social wellness	

Results

In this section, I detail the four themes that emerged from the interviews conducted with the 10 Grade 3–5 mathematics teachers. Each theme is supported by

evidence from the interviews. Ultimately, these themes provide insights that help answer the research questions regarding teachers' instructional practices and the support needed for effective learning loss recovery. In the following discussion, Themes 1 and 2 aligned with responding to RQ1 about teacher experiences with instructional practices, and Themes 3 and 4, respectively, informed RQ2 about needed support.

RQ1: Teacher Experiences With Instructional Practices

To address RQ1 about teachers' experiences with instructional practices to address COVID-19 learning loss, teachers indicated that they used best practices but were not always effective at remediating learning loss. They also indicated that formative assessments and spending more time were essential in recovering from learning loss. In this section of the results, I discuss how Themes 1 and 2 informed RQ1.

Theme 1: Evidenced-Based Instructional Practices Were Not Always Effective Remediating Learning Loss

TPS Grades 3-5 teachers used evidence-based instructional practices for struggling students to overcome COVID-19 learning loss, although a few teachers indicated that the practices were not always effective for remediating pre-existing and COVID-19-created learning loss. The participants stated various practices; however, all participants mentioned three practices the most: differentiated instruction, manipulatives, and computer-assisted or technology-assisted learning. Five axial codes fall under this theme: computer- or technology-assisted learning, differentiated instruction, manipulatives, other practices, and barriers to remediating learning loss.

Computer- or Technology-Assisted Learning. The 10 participants shared the importance of having technology. Computer or technology-assisted learning highlights the importance of ensuring that both parents and students have access to and are comfortable using the available technology and platforms, such as Google Classroom, offered by their school district during the pandemic, as well as the benefits of technology in the classroom when students and teachers returned to the brick-and-mortar setting. Computer access was crucial for students to learn thoroughly during the COVID-19 lockdown. As P10 stated, "Making certain that you know people have access to technology and are familiar with or have platforms that help parents and students take full advantage of that technology and Google Classroom." Another participant, P7, said, "COVID-19 kind of opened that door for technology to get kick-started." This quote suggests that the COVID-19 pandemic accelerated the adoption and utilization of educational technology, opening new possibilities previously thought impossible. The statement also implies that the forced transition to remote and technology-driven learning during the pandemic prevented further procrastination in teachers and schools embracing these advancements to support students with the available technology. P3 explained how their school district provided “more resources than I would expect for students to use and understand, like Wise software application and other resources with the use of technology." P2 further elaborated on the benefits of technology, explaining, "So the technology was great because I could throw it up on the screen. And then the kids that were online could watch me instruct the kids that were in person." Having the available

technology was beneficial, as it allowed teachers to provide instruction to both in-person and remote students simultaneously.

Technology also played an important role in the classroom once teachers and students returned to their schools. P9 encouraged students to take responsibility for their learning by exploring resources like YouTube. The overall overview highlights the critical role of technology and access to digital platforms in supporting effective instruction during the COVID-19 pandemic.

Differentiated Instruction. Additionally, all 10 participants, regarding teaching students who are struggling in mathematics, shared the importance of differentiation instruction by adapting content to students' interests and skill levels, be it individualized, in small groups, or whole groups. The participants' use of differentiated instruction is evidenced in quotes from P3, P6, P8, and P10. P8 explained, "I use different strategies to encourage students to participate in our learning," P6 shared,

> So, for me, I had to differentiate my instructional techniques, [and] show them different ways to solve a problem, but at the same time, I guess I found it challenging because each student has different needs and learns in different ways.

While P6 differentiated the techniques used with the student, P3's use of differentiated instruction in the classroom involved small groups, making sure to maximize the use of the vast classroom space. P3 stated,

> I did do [differentiated instruction] in the classroom. I work in a lot of small groups because I have to meet the needs I have. I have a good amount of space to get to my class, so I do. A lot of. Small groups. I use a teaching method that's

> called I do. I do. We do? You do. So, I teach them, and then we. They do it together, and then they have independent time to learn the material.

Additionally, P10 acknowledged that students learn differently and, thus, may require different strategies to learn the mathematics lesson. P10 shared,

> You know that everyone learns differently. That's simply how I operate in my own space. So yeah, there's going to be something on the board. There's going to be something on your desk. There's going to be something that they can visually see.

All teachers used differentiated strategies to support students struggling in elementary mathematics.

Manipulatives. All 10 participants shared that manipulatives help students grasp abstract concepts by letting them pick things up, move them around, and look at them carefully. P3 used manipulatives with their students, stating, “I use a lot of manipulatives…I feel like students learn best when their hands are on with things.” P6 deemed hands-on learning essential, emphasizing the inclusion of manipulatives and tactile experiences to enhance student engagement. P5 emphasized the importance of using manipulatives and hands-on experiences in mathematics instruction, stating, "So, it's definitely hands-on, manipulative, making things as life experiences. You know, if students don't feel like they're going to need to know something—because a lot of kids hear their parents say, 'I'll never need to know this'—they may question when they will use these concepts again." These quotes show that manipulatives are crucial for helping students connect mathematical concepts to real-life situations. These hands-on

approaches can counteract students' perceptions that math is irrelevant to their lives and enhance their engagement.

Similarly, P7 noted,

> For me, to make it engag[ing], I try to make [math] as fun as possible. If I have an assignment that's on paper, I try to convert it into something interactive so that it can become a game. Many students come to math saying they struggle before even giving it a try, which leads to a lack of confidence. Those games help boost confidence and participation.

The takeaway from this insight is that transforming traditional assignments into interactive games can significantly increase student engagement and participation in math. This strategy also helps to build students' confidence, particularly for those who enter the classroom with a mindset that math is challenging.

P1 and P8 shared the support they received regarding using manipulatives in their classrooms. P8 received training on using manipulatives in the classroom. She stated that,

> [The training] showed us how to effectively use manipulatives in the classroom, and then it came with a box full of manipulatives, the same as would be used in the training. We were able to receive it as a part of training to take back our classroom. Use with our students. So, I believe we did receive a good amount of training and support with manipulatives.

P1 shared that the school administrator always checked to see if they needed more manipulatives in their classroom. P1 and P8 quotes show that not only did they use

manipulatives in their classrooms, but usage was encouraged by the administration based on the amount of support they received to implement the tools effectively.

Other Practices. Four of the 10 participants also shared valuable insights into their teaching practices, emphasizing the importance of fundamental skills reinforcement and the power of cooperative learning. They highlighted the use of various strategies to support student learning, engagement, and collaboration, particularly in the context of the challenges posed by the pandemic. P8 emphasized engagement and cooperative strategies, mentioning the use of competitions and small group work to motivate students to actively participate in their learning. The need for students to "retrigger" and "recalibrate" their minds to recall past knowledge was also pointed out by P8, as this is crucial for building new concepts. P4 also mentioned daily math drills as a method to ensure students grasp place value and can complete multiplication charts. Additionally, P1 praised the use of the Eureka mathematics curriculum for its multiple textbooks and comprehensive approach that fosters cooperative learning. P2 shared their child-centered instructional perspective, aiming to teach from the students' viewpoint rather than an adult's.

Barriers to Remediating Learning Loss. Despite using evidence-based practices, three TPS Grade 3–5 mathematics teachers indicated that these practices were not always effective in remediating pre-existing learning gaps and those created by the COVID-19 pandemic. P1 highlighted the compounded challenges faced by special education students and emphasized the inadequacy of current strategies in addressing their significant learning needs, estimating that about 40% of their students had severe

learning deficiencies that were exacerbated by the pandemic. P4 explained the difficulties they encountered, stating that many of their students lacked essential skills required for their grade level. As a result, they needed to teach basic skills alongside grade-level content, which posed a significant challenge, especially for students who experienced disruptions during their foundational years. P3 mentioned the shortcomings of extended learning opportunities in closing pre-existing learning gaps, which I will discuss further under Theme 2.

Summary

The insights under Theme 1 reveal that TPS Grade 3–5 mathematics teachers are committed to employing evidence-based instructional practices to address student learning loss. These practices emphasize differentiated instruction, the use of technology, manipulatives, fundamental skills, and student engagement. By focusing on these strategies, teachers aim to help struggling students recover from the impacts of learning loss experienced during the pandemic. However, as noted by some teachers, the barriers to implementing these practices highlight the ongoing challenges posed by the pandemic on educational development. This information directly informs RQ1 by illustrating teachers' specific instructional practices and the contextual factors that may hinder their effectiveness in remediating learning loss.

Theme 2: Formative Assessment and Creating Opportunities for Additional Learning Time Are Essential

The second theme is also connected to RQ1. Two axial codes fell under Theme 2: formative assessment and opportunities for addressing learning. All 10 teachers believed

formative assessment and additional learning time were essential to learning loss recovery. Additionally, four teachers also expressed testing issues. In the following sections, I provide supportive evidence of these findings.

Formative Assessments. Overall, the responses reflected a strong consensus on the value of formative assessments in fostering a responsive and supportive learning environment. The 10 participants overwhelmingly favored formative assessments for understanding students' learning needs. The similarities in their responses are demonstrated in the following paragraphs.

P6 emphasized the necessity of ongoing assessments to pinpoint students' current levels and guide their progress, stating, “We need to continuously assess our students to know exactly where they are and how we can help them move forward.” P9 said, “Formative [assessment] is something I could just do…[It] is similar to a quiz or a daily check-in.” Both quotes demonstrate that formative assessments are valuable tools for identifying and addressing underlying misconceptions in student understanding, which can aid in their learning recovery.

P8 shared their “practice of assessing students based on weekly learning rather than the overall curriculum, ensuring that teaching aligns with student understanding.” The takeaway from this insight is that this approach ensures that instruction aligns closely with student understanding, allowing for more targeted and effective teaching. P5 pointed out that “formative assessments were essential for staying on track with students' learning needs, while summative assessments played an important role in evaluating overall mastery.” Thus, both types of assessments are necessary; formative assessments help

guide instruction, while summative assessments provide a broader view of student achievement.

P7 highlighted “the importance of immediate feedback from formative assessments,” stating that “effective feedback builds student confidence and clarifies learning goals.” Effective feedback not only builds student confidence but also clarifies learning goals, making it a critical component of the learning process. Furthermore, P3 emphasized that formative assessments are crucial for identifying areas where students struggle, allowing teachers to adjust their instruction accordingly: “They let me, as a teacher, know where I need to close the gaps and where my students are not getting mastery.” P4 discussed baseline assessments, stating they provide problems from the end of the third-grade curriculum to assess where students stand before advancing to fourth grade. Overall, the participant responses reflected a strong consensus on the value of formative assessments in fostering a responsive and supportive learning environment.

Testing Issues. While all teachers valued using formative assessments, four teachers noted issues with testing overall. Participants 2 and 10 expressed wariness with too much testing. P2 said,

> I believe formative assessments play an important role in education, but they shouldn't be overly frequent. After the onset of COVID-19, we began administering assessments every two weeks, and I found that this approach was overwhelming—not only for me as a teacher but also for my students. I think it would be more beneficial to conduct assessments on a monthly basis instead. This would allow us more time to prepare and reduce burnout. While I agree that

> assessments are valuable, I believe we should consider slowing down their frequency.

P10 had a similar sentiment, stating:

> But if they're testing every other week—every other two or three weeks—it's a test for this. It's a test for this. Then you have your classroom. It's just too many. It's too much. I don't believe it's necessary for you to conduct so many tests, checking kids' location every two weeks.

P6 and P3 highlighted the anxieties that students may feel from testing taking, especially high-stakes tests. Participant 6 believed that "kids kind of get scared when they have a big overall test, so they don't take it as seriously as something like a little smaller and things than topics that they have been learning in the previous weeks." Test anxiety was also a concern for P3, who said,

> I do believe that students do get test anxiety, so they may understand what's going on in there, and then they get the test, and then they freeze. And it's like everything is gone because they know that it's a test that can be scary.

Thus, while teachers appreciated formative assessments, concerns regarding the frequency and high-stakes nature of testing were acknowledged.

Opportunity for Additional Learning Time. Opportunities for additional learning time emerged as a critical need for learning loss recovery, which I also grouped as an axial code under Theme 2. Additional learning time mentioned by the participants included tutoring and summer school. The 10 participants expressed that extended instructional periods are essential for addressing the gaps in student learning caused by

the pandemic. P1 stated, “We simply don’t have enough time during the school day to cover everything, especially with students who are falling behind.” This observation highlights a significant challenge within the educational system: time constraints. The quote indicates that the limited school day can hinder teachers' ability to address the diverse needs of all students, particularly those who require additional support, underscoring the necessity for additional learning opportunities beyond the standard curriculum.

P4 and P10 also emphasized the necessity of targeted interventions such as after-school tutoring and extended learning time. P4 stated, “Honestly, I really do believe so, especially after-school tutoring and potentially an extended school year. As you know, sometimes we might have to spend two days on certain TEKS.” This quote reveals that these strategies can provide the focused instruction needed to master specific learning objectives (TEKS), ensuring that students do not fall further behind. P10 shared that “offering more additional time is great. There have been after-school and Saturday school tutoring programs. They also offer boot camps for various subjects, including math and science, among others.” This statement highlights the various initiatives being implemented to provide extra learning opportunities. These programs are essential for reinforcing knowledge and skills, allowing students to engage more deeply with the material in a supportive environment.

P7 pointed out the benefit of additional learning opportunities due to the cumulative nature of math learning, where each concept builds upon the previous one. P7

said that “offering students additional learning time plays a major role because math is an ongoing subject.” P7 further elaborated on the importance of additional support, stating,

> If you fall behind one year, that can hurt you moving forward because the course or the TEKS are going to continue to push you through. Again, with the learning gap, that’s why it’s a struggle right now; you must work back a few grades to get them caught up.

This comment emphasizes the cascading effects of falling behind in math. A lack of foundational understanding can create a compounding disadvantage, making it critical to address learning gaps promptly through tailored interventions.

Lastly, P1 highlighted the district’s commitment to ensuring that all students have access to additional learning opportunities. P1 stated,

> Not only is additional learning time beneficial for learning loss recovery, but it is also mandatory for students in the district. If a parent chooses not to send their child, it becomes mandatory. If a parent refuses to send their child, that is the required action, and it has been submitted to the school.

Making additional learning time mandatory reflects a proactive approach to addressing learning loss, but it also raises questions about parental engagement and the challenges of enforcing attendance. This structured approach not only addresses immediate academic needs but also fosters a culture of accountability and support within the educational community. By prioritizing additional learning time, schools can better equip students to overcome obstacles and achieve long-term success.

While most teachers believed that additional learning time was important, three teachers (P8, P5, and P3) recognized its value but expressed concerns. P8 stated that "while more time would help some students, it would not help others: It would make them more tired—tired because now they've been sitting in class for 90-plus minutes." This quote highlights the nuanced perspective that, while extended learning can be beneficial, it may not be universally effective and could lead to fatigue for some students, suggesting a need for balance in instructional time. P5 shared, "I'm kind of torn on giving students additional learning time. I think in-class time is fine, but there's so much stimulation during the day. I just don't think after-school tutoring is effective." This quote indicates a concern about the overall effectiveness of additional learning time in the form of after-school tutoring, pointing to the potential for cognitive overload amidst a day filled with various stimuli.

P3 agreed that extra learning time was beneficial; however, they thought that this additional time often fell short of closing educational gaps, especially given the limited time available for tutoring and summer school. Additionally, P3 did not believe that additional learning time could sufficiently close COVID-19-created learning gaps. P3 said,

> I think additional learning time is good, but I feel like it still doesn't close the gap. When I do tutor, I only have an hour, and that's really not enough time for them to catch up on everything. Summer school is not that long, so I feel like it's helpful, but it doesn't close the gap created by COVID.

P3's comment emphasizes the complexity of the issue surrounding additional learning time, revealing that while teachers acknowledge its importance, they also recognize that effectiveness varies among students and contexts. The insights from P3, P5, and P8 suggest the need for more tailored approaches to learning time that consider individual student needs and the potential for diminishing returns when it comes to extended classroom hours.

Summary

The second theme is closely linked to RQ1, which asks about the instructional practices used by TPS Grade 3–5 mathematics teachers to address student learning loss. All 10 teachers agreed that formative assessments and additional learning time were vital for recovering from learning loss. The participants highlighted the importance of formative assessments; however, concerns were raised by a few regarding the frequency of testing. Four teachers expressed discomfort with the overwhelming pace of assessments, indicating that too much testing could lead to burnout for both teachers and students. Testing anxiety was also a concern, as noted by participants who highlighted the impact of high-stakes tests on student performance.

Additionally, the theme underscores the critical need for opportunities for additional learning time, which included tutoring and summer school. Participants agreed that extended instructional periods are essential for addressing the gaps in student learning exacerbated by the pandemic; however, some teachers acknowledged potential drawbacks, such as student fatigue from extended activities and doubts about the effectiveness of after-school tutoring. The insights from Theme 2 directly inform RQ1 by

illustrating the instructional practices, specifically formative assessments, and the need for additional learning time, that teachers are implementing to mitigate the effects of COVID-19 on student learning loss. These findings reveal both the strengths and limitations of current practices, highlighting the need for a balanced approach tailored to individual student needs.

RQ2: Teacher Support Received and Needed

Before learning what support the participants needed to address mathematics learning loss, RQ2, I wanted to know what support they received during and after COVID-19, which led to Theme 3. Teachers' experiences with support were mostly positive and plentiful but sometimes ineffective. Additionally, they wanted more targeted professional development and resources to address learning loss recovery needs. In this section of the results, I discuss how Themes 3 and 4 informed RQ2.

Theme 3: School and District Administrators' Support Positive but Sometimes Ineffective

There were two axial codes under Theme 3: positive support and limited or ineffective support. While all 10 educators expressed appreciation for the assistance provided by their schools and districts, highlighting effective communication and resource availability, four reported limitations to the support received. Positive sentiments were often associated with structured interventions and professional development offered by school and district administrations. Conversely, some teachers voiced limitations regarding the support received during and after COVID-19.

Positive Support. All participants expressed appreciation for the assistance provided by the school and district administrators, highlighting effective communication and resource availability. P1 noted the provision of supplementary resources and professional development, explaining that the district offered workshops and in-person coaches to support teachers. P1 stated, "Every Wednesday, the school district provided professional development, coaching for core teachers, and additional training in technology and software." This quote underscores the district's commitment to enhancing teacher effectiveness through regular professional development. P2 reflected on their experiences before, during, and after the COVID-19 pandemic, emphasizing the proactive steps taken by the district in developing a supportive curriculum. P2 stated, "Because I've never seen that before… They actually did the curriculum for the teachers, and I loved it because it addressed the introduction, remediation, extension, hands-on activities, group collaboration, and vocabulary." This reflection highlights the comprehensive nature of the curriculum designed by the district. By addressing various instructional strategies and learning needs, the curriculum not only supports diverse learners but also empowers teachers to deliver effective lessons that engage students.

Furthermore, P2 recognized the district administrators' foresight in anticipating the challenges teachers would face, saying, "I can say that I noticed they put a lot of forethought into all the things that a teacher would need… I think they knew that we were going to be under a tremendous amount of stress." This statement emphasizes the proactive approach to supporting educators in the district. By anticipating potential challenges, the administration demonstrated a strong understanding of the pressures

teachers face, thereby creating a more resilient educational environment during a tumultuous time. P2 concluded that the district administrators went out of their way to support teachers during this period, reflecting a strong appreciation for the thoughtful curriculum design. Both quotes from P2 reinforce the idea that when district leaders prioritize teacher support and professional development, they create a foundation for improved instructional practices and better student outcomes.

Support in the form of coaching was also mentioned by the teachers. P3 expressed a strong sense of support in their teaching environment, stating, "I receive a lot of support, and if I need anything, we have instructional coaches." P3 specifically highlighted the effectiveness of their math instruction coach, noting, "My math instruction coach is very good at making sure that I have what I need. She will find resources to ensure I can support myself." P4 also mentioned the value of the availability of coaching and resources for teachers. P6 highlighted a math curriculum specialist who actively supported teachers by observing classroom needs and providing hands-on training, thereby enhancing the teaching experience.

Limited or Ineffective Support. While all 10 participants indicated that they received positive support during and after COVID, four (P1, P3, P6, and P7) also expressed concerns about the limitations of this support. Two teachers (P1 and P3) felt underprepared to address the unique challenges brought about by the pandemic. For example, P1 remarked that the positive support was not enough, and the training and assistance provided were not sufficient to meet the evolving needs of the classroom. P1 stated,

> We received some training, but it wasn't enough to cover the new realities we're facing. I need assistance in managing the curriculum and instructional strategies. All I asked for was assistance with the curriculum. There are several students in my class who are part of the behavior unit. And, you know, if one of them is having a bad day, they can easily distract and cause the entire class to become agitated.

P3 shared a similar sentiment, acknowledging that while the training sessions were somewhat disorganized and overwhelming, they did have a couple of training sessions. P3 stated,

> Indeed, it is one of those. It's a little mixture of both. Sometimes it's beneficial, and sometimes it's OK. Why am I here? There'll be some PDs where they're just teaching. We know how to work on a system, and I'm like, OK. How is that benefiting me?

Thus, P3 also questioned what other support could have been provided.

P7 and P6 expressed feeling a lack of adequate support during the transition to digital learning in the post-pandemic environment. P7 noted, “I didn't receive as much support as I feel I should have… I think there should have been more training for teachers then, so we knew how to navigate and help kids catch up to speed." P6 echoed this sentiment, stating,

> Honestly, I didn't receive as much support that I feel like I should have because all of us were coming off of a pandemic, and the learning styles we were used to teaching, which was via Zoom, which we're now incorporating in schools where

> everybody's going digital. So, there were a lot of different transitions. And I feel like there should have been more training for teachers then, so we know how to navigate and help kids catch up to speed."

P6 also expressed frustration that the training offered was not mandatory, requiring teachers to make the effort to schedule and attend, which was challenging given their existing workloads.

Summary

Overall, while all teachers appreciated the support they received, some participants indicated that the level of assistance and training provided during the pandemic and the transition to digital learning was insufficient to fully address the challenges they faced in the classroom. Positive sentiments were often linked to structured interventions and professional development offered by school and district administrations, which facilitated effective instructional practices. However, other teachers reported feelings of isolation and limited support, suggesting that their experiences varied significantly. These findings under Theme 3 address the support that teachers received during and after COVID-19. The indication of inadequate support in certain cases directly informs RQ2 by highlighting the critical areas where TPS Grade 3–5 mathematics teachers need further assistance. Specifically, understanding the gaps in support received helps identify the essential resources and training that educators require to effectively tackle student learning loss and enhance their teaching practices in a post-pandemic environment.

Theme 4: Professional Development and Resources Tailored to Specific Needs

The fourth theme emphasizes the critical need for ongoing support for teachers to help remediate learning loss for struggling students in elementary mathematics. This theme also addresses RQ2. The two axial codes include overall support needed and

support needed for social and psychological wellness participants. All participants mentioned needing support overall due to the pandemic and the challenges they faced. Only two out of the 10 participants also shared the need for support for student social and psychological wellness.

Overall Support Needed. Overall, the participants stressed several key elements that were needed to provide support for struggling students in mathematics:

- Parental accountability: The teachers felt that more parental involvement and responsibility were needed to support their children's learning, especially for struggling students in elementary mathematics.
- High-quality professional development: The teachers expressed a need for more relevant and effective professional development opportunities. They believed this would enhance their ability to address the learning loss experienced by struggling students in elementary math.
- Instructional materials and resources: The participants highlighted the importance of having access to effective instructional materials and resources that could aid them in supporting the learning recovery of struggling math students at the elementary level.

All 10 teachers were particularly vocal about needing more support from parents to help address the learning challenges faced by struggling elementary math students. They felt parental accountability and involvement were key components of providing holistic support for teachers and students. P5 highlighted the importance of "promoting help from home," emphasizing the need to involve parents and caregivers in the

educational process. P8 stated, “I'm thinking maybe to the point where when the children were at home during the pandemic, the parents weren't so strict as far as making them study and be online and get the work done.” This quote illustrates teachers’ thoughts about how lax some parents were in facilitating learning during remote learning. P6 shared that “increased parental assistant involvement would help the teacher focus on instruction while effectively meeting individual student needs.” The perspective from P7 stated that “Parents showed very little interest in their students' mathematics skills.” This sentiment was echoed by other participants, such as P1, P2, P6, and P9, who expressed the necessity of parental support, especially when students are already struggling academically. Additionally, two participants identified with the challenges faced by new teachers, who often feel "thrown into this program" without adequate support. P1 and P4 underscored the importance of providing more support and guidance to these educators to help them navigate the demands of the classroom.

Statements from the participants suggest that effectively supporting student learning requires a comprehensive, collaborative approach that extends beyond the classroom. Ultimately, the participants' statements suggest the need for a team or village approach, where teachers, parents, and the broader community work together to support student learning. P6 eloquently captured this idea, emphasizing the need for support to be provided "across the board" to ensure students receive the holistic guidance they require.

All participants indicated that effective professional development and resources are crucial for supporting educators. As P2 expressed, teachers need more than just "lip service" - they require hands-on training and support. When new technologies or apps are

introduced. P3 emphasized the need for district representatives to come into the classroom, observe teachers using the tools, and provide guidance on proper implementation. P2 deemed this personalized support essential to ensure teachers are using the resources effectively and not wasting valuable instructional time. Similarly, P5 highlighted the need for more flexible reimbursement and access to essential classroom materials, such as document cameras and whiteboards. P7 thoughts were that “the administration provides resources and instructional coaching, but teachers require flexibility in the curriculum and additional classroom support staff. The school provides resources and instructional coaching, but teachers require flexibility in the curriculum and additional classroom support staff.” P3 further elaborated on the need for more adaptable instructional planning guides.

Ultimately, the participants' feedback underscores the importance of consistent, targeted professional development and resources that are tailored to the specific needs of teachers and their classrooms. As P7 suggested, effective learning recovery and support require consistent feedback, coaching, and the sharing of best practices among educators. Districts and schools can empower teachers to maximize student learning and success by providing this level of comprehensive, collaborative support.

Support for Psychological and Social Wellness. Only four teachers emphasized the importance of addressing behavioral, psychological, or social factors to support students' overall wellness. Their feedback highlights the critical need for comprehensive strategies that can make a significant difference for students, especially during

challenging times. P1 shared the importance of behavioral reinforcement and addressing classroom distractions, stating,

> In my classroom, one of the most important areas of support, if not two, is behavioral reinforcement. Distractions in the classroom are the second issue. I need to address, along with providing additional support to my high-achieving students and those in the top four.

Similarly, P10 expressed a desire for someone to "handle the psychological aspects of it all." Teachers have observed that many students are grappling with increased anxiety and emotional distress, a situation exacerbated by the pandemic. This emotional turmoil is not only affecting their mental health but also their academic performance.

P9 emphasized the role of the teacher in implementing social wellness strategies, explaining, "The teacher's ability to implement social wellness helps students adjust socially within and outside of the classroom." P4 suggested that the district could do more by "hiring other outside sources to come in and give the students the extra help that they need." The feedback from these teachers highlights the critical need to address behavioral, psychological, and social factors to support student well-being and academic success. Implementing effective strategies in these areas can make a significant difference for students, especially during challenging times.

Summary

The fourth theme emphasizes the critical need for comprehensive support systems, including parental engagement, high-quality professional development, effective instructional resources, and wellness support, to assist TPS Grade 3–5 mathematics

teachers in remediating learning loss for struggling students. These findings directly inform RQ2, which asks about the support teachers need to address student learning loss. The quotes from participants reveal that, despite receiving positive support, they required additional resources and assistance to effectively tackle the ongoing challenges associated with mathematics learning loss recovery.

Discrepant Cases

In qualitative research, discrepant cases provide valuable insights by highlighting responses that differ from the predominant themes identified in the study. These discrepant cases can provide depth to the research findings by illustrating the complexity of experiences among teachers, and they can help identify areas for further investigation or highlight the need for tailored support strategies. Based on the themes provided, there were a few discrepant cases. For Theme 1, while most teachers reported using evidence-based practices effectively, P2, P6, and P7 stated that they relied on traditional teaching methods due to a lack of training or resources, suggesting that they did not implement evidence-based practices as expected. This discrepancy highlights the need for more comprehensive professional development and resource support to ensure all teachers can effectively use research-based instructional strategies.

Additionally, for Theme 4, although most participants indicated a need for more support, P3, P4, P5, and P9 mentioned feeling adequately equipped or supported, perhaps due to strong collaboration with colleagues or the implementation of specific programs that helped them address learning loss effectively. This discrepancy suggests that tailored support strategies may be required to meet the diverse needs of teachers and that sharing

best practices among educators could be beneficial. Overall, these discrepant cases provide valuable insights that can inform future research and the development of more targeted support systems for teachers, ensuring that all educators have the resources and training necessary to address the complex needs of their students.

Evidence of Trustworthiness

To be trusted, basic qualitative researchers must show that the data analysis was done precisely, consistently, and thoroughly. I, the researcher, ensured that the data were trustworthy by recording, systematizing, and revealing the analysis methods in enough detail for the reader to decide if the process was reliable for this research study. I employed several steps to ensure the data analysis's credibility, transferability, dependability, and confirmability. In the next section, I present the evidence of trustworthiness, addressing credibility, transferability, dependability, and confirmability.

Credibility

The actual value of basic qualitative research is measured by its credibility, which indicates the reliability of the study's findings. The reliability of the results depends, in part, on the expertise of the researchers and the soundness of their methods. I emphasized the importance of basic qualitative research's credibility, validity, and researcher experience in ensuring the reliability of findings. I strived to demonstrate their credibility as a source by being free of bias. I explained the methods used in this research study to demonstrate the data analysis's precision, consistency, and thoroughness. I used first-hand evidence in the form of interview quotes, which adds to the credibility of the findings. I employed member checking, data saturation, and reflexivity techniques. I trust

that credibility related to the research study showed confidence that I have been transparent and truthful about the data, findings, and interpretations (see Yin, 2014, 2016).

Member checking, also known as respondent validation, is a method used to check the reliability of a sample's members (Candela, 2019). I used member-checking data or results to verify accuracy and ensure a good fit with the study's goals (see Creswell & Creswell, 2018; Creswell & Poth, 2018). Member checking was done during the interview process and at the end of the study. I had to establish trust with the interviewee and verify the accuracy of the information by using member checks (see McGrath et al., 2019).

I used data saturation, which involved collecting and analyzing data until no new information emerged. At that point, I was confident that I thoroughly understood the phenomenon under investigation. Reflexivity involved reflecting on my biases, assumptions, and values that may have influenced my research to be aware of the potential influence my experiences and biases may have on the findings; to accomplish reflexivity, I took notes on participants' comments and my thoughts during the interview, made memos of the interviews as soon as possible after their completion, and continued editing my researcher subjectivity statement. I collected interview data from all participants using the researcher-created interview guide (see Appendix D) to establish credibility. The interview protocol was composed of open-ended questions, which yielded robust, detailed responses instead of low rigor, "yes" or "no" questions. The

interview guide content was confirmed through expert review and pilot interviews to enhance credibility.

Transferability

Transferability of the findings refers to the extent to which a research finding can be applied in other contexts and studies. The transferability of qualitative study findings depends on detailed descriptions of how the study was carried out and the ability to be replicated in a different environment (Maxwell, 2021). I used thick descriptions to accomplish transferability. Thick descriptions involve a detailed and context-rich description of social phenomena, emphasizing the studied phenomenon's historical, cultural, and subjective aspects. I clearly described the study's setting to highlight how the study unfolded and described how I conducted and recorded Zoom interviews.

Dependability

I used transcript checking to ensure dependability. Each participant agreed with the accuracy of their data and had no questions or concerns about their spoken words. In qualitative research, dependability assures the study's replicability "if the inquiry occurred within the same cohort of participants, coders, and context" (Forero et al., 2018, p. 3). I maintained the study's dependability through a rich and consistently described research method where all steps were documented in detail. Established dependability and the potential for replicability are essential for a reliable research study. The dependability of this research study is related to how the same or similar data outcomes, regardless of the participants, will occur. I conducted an audit trail to ensure the results were consistent over time.

To accomplish reflexivity, I took notes on participants' comments and my thoughts during the interview, made memos of the interviews as soon as possible after their completion, and continually edited my researcher subjectivity statement. I used reflexivity to ensure the obtained data and the research questions aligned with the purpose of the study and the procedures detailed in Chapter 3.

Confirmability

I kept a record of the interviews and data analysis process while recognizing my own biases. To reduce bias, I wrote the interview questions to seek participants' information and ensure that the information represented their views. Also, I asked participants to check their responses to ensure accuracy. I cross-checked emerging themes by creating a matrix of participants' spoken words. The researcher must show that they have been trustworthy in reporting the data specifically based on the dialogue and words used by the participants. Confirmability points to the idea of objectivity. I implemented an audit trail to assess the confirmability of the data by ensuring that I did not make careless errors in conceptualizing the study, collecting data, interpreting the findings, or reporting the results I maintained detailed records of all steps taken during the research process, including notes and transcripts of the interviews, so they could be made available to other researchers. Keeping detailed records allowed other researchers to evaluate the research process and the findings and provide a means for replicating the study—the confirmability of all results and document keeping will be kept in a secure location.

Summary

I presented the results of the data analysis in a narrative form in Chapter 4. Based on two research questions, I discussed the research findings. Many codes and themes emerged during the data analysis process, and the procedures for gathering and analyzing the data were explained. The themes were developed from the data coding and used to address the research questions. These themes highlight educators' challenges and underscore the essential strategies to support students effectively. In Chapter 5, the findings will be interpreted in connection to the broader literature review and conceptual framework, and the study limitations and recommendations for further research will be discussed. The implications for social change and conclusions drawn from the research study questions based on the data analysis presented in Chapter 4 will also be provided.

Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this basic qualitative study was to explore TPS Grades 3–5 mathematics teachers' instructional practices and the support needed to improve students' pandemic-related learning loss. To gather data, I developed semistructured, open-ended interviews aligned with the study's purpose, research questions, and literature review. The semistructured, audio-recorded interviews were conducted via Zoom over 2 months with 10 elementary mathematics teachers from TPS.

The analysis of the data revealed four key themes:

- Theme 1: TPS Grade 3–5 mathematics teachers indicated that they used evidenced-based instructional practices to help students overcome COVID-19 learning loss, although they were sometimes ineffective.
- Theme 2: TPS Grade 3–5 mathematics teachers indicated that formative assessment and creating opportunities for additional learning time were essential to learning loss recovery.
- Theme 3: TPS Grade 3–5 mathematics teachers indicated they received positive support from school and district administrators during and after COVID-19, although the support was sometimes ineffective.
- Theme 4: TPS Grade 3–5 mathematics teachers indicated that now that they are back in the classroom, they need professional development and resources tailored to the specific needs of addressing learning loss recovery in mathematics.

These themes provide valuable insights into the challenges educators face and the essential strategies needed to support students effectively in addressing pandemic-related learning loss. I supported each theme with evidence from the interviews.

Interpretation of Findings

In this section, I interpret the study's results and discuss whether the themes support, expand, or contradict the prior research and study's conceptual framework of learning loss recovery. Due to the COVID-19 pandemic, learning recovery or learning loss recovery steps were recommended in research for teachers and school and district administrators to address the learning loss resulting from school closures and remote learning (Hanover Research, 2020). The four research-based categories are (a) opportunities for additional learning time, (b) assessment, (c) student social and psychological wellness, and (d) support for teachers. Many participants engaged with the four categories of learning loss recovery to improve the mathematics learning outcomes of struggling elementary students. However, not all participants used all four types of recovery techniques equally.

Theme 1: Evidenced-Based Instructional Practices Were Not Always Effective Remediating Learning Loss

TPS grade 3–5 mathematics teachers used evidenced-based instructional practices for struggling students to overcome COVID-19 learning, although a few teachers also indicated that the practices were not always effective for remediating pre-existing and COVID-19-created learning loss. This theme aligns with the evidence-based practices highlighted in Chapter 2's literature review. The theme also extends the discussion by

acknowledging these strategies' limitations in fully addressing students' diverse needs. The practices used the most by the participants included manipulatives, computers, technology, and differentiated instruction.

CAI provides diverse learning experiences through interactive activities that enhance student understanding and engagement (Foster, 2023). Rooted in constructivism, CAI emphasizes constructing knowledge based on prior learning (Kaya & Aydin, 2016). Cullen and Hertel (2023) found that computer technology positively impacts mathematics achievement, particularly for low-performing students, with problem-solving systems demonstrating the most significant benefits.

The participants also shared that differentiated instruction can be beneficial in addressing learning loss. Hanover Research (2021) noted that differentiated instruction may be beneficial when addressing learning loss. Lai et al. (2020) investigated the effects of differentiated instruction interventions on sixth graders and found that differentiated instruction significantly improved students' mathematics self-efficacy, learning motivation, and problem-solving skills in mathematics. According to Roberts and Inman (2023), successful learning experiences and positive emotional responses, such as increased self-efficacy, will likely occur as students' learning needs are met in a differentiated environment. Differentiated instruction is not merely a strategy; it is a fundamental approach that recognizes and embraces the unique learning paths of each student. Educators can create a more supportive and effective learning environment by incorporating various teaching methods and engaging students through their preferred

learning styles. Ultimately, this commitment to differentiation empowers students to take ownership of their learning and enhances their overall academic success.

Theme 1 also highlights the critical role of manipulatives in mathematics education, particularly in addressing the learning loss experienced during and after COVID-19. Manipulatives are concrete objects that enable students to visualize and physically engage with abstract concepts, enhancing their understanding (Tseng et al., 2023). Dumale and Gurat (2023) found that these tools, which include various objects, charts, and interactive activities, significantly improve mathematical skills and comprehension among learners. Using manipulatives has also increased student engagement and understanding across diverse mathematical topics, such as graphing, decimals, geometry, and arithmetic (Kalogeropoulos et al., 2023). Overall, manipulatives are a common language that boosts interest and enjoyment in mathematics while enhancing overall learning experiences (Foulkes et al., 2023). These findings underscore the importance of manipulatives in creating an interactive and practical environment for recovering learning losses in mathematics education.

Theme 2: Teachers Indicated Formative Assessment and Creating Opportunities for Additional Learning Time Were Essential

Theme 2 is that TPS Grade 3–5 mathematics teachers indicated that formative assessment and creating opportunities for additional learning time were essential to learning loss recovery. Hanover Research (2021) reported that formative assessment and progress monitoring were emphasized in schools with successful mathematics performance outcomes. Formative and summative classroom-level assessments are

necessary for implementing recovery interventions and monitoring the effectiveness of the interventions (Hanover Research, 2021; Salciccioli, 2021; The World Bank, 2023). Assessments and opportunities for additional learning time are two components of the learning loss recovery framework that guided this study and were mentioned the most by the participants. Theme 2 is connected to the conceptual framework of learning loss recovery, which emphasizes providing additional instructional time to enhance student learning outcomes and using assessment to inform instructional practices (Hanover Research, 2020, 2021; Morton & Hashim, 2023).

All the participants agreed that opportunities for additional learning enhanced the success of learning loss recovery and that additional instructional time, for example, before school, after school, or on Saturday, helped address learning loss recovery. This finding aligns with prior research (see Guill et al., 2020; Jiang et al., 2021; Jones, 2022; Kuhfeld & Tarasawa, 2020; Wortham & Forgety Grimm, 2022). Prior research also shows that additional learning opportunities like accelerated programs (Wortham & Forgety Grimm, 2022), summer learning programs (Dorn et al., 2020; Jones, 2022), supplemental online instruction (Carr-McMichael, 2022), and tutoring (McDonald et al., 2023) can also help address learning loss. Başokçu and Güzel (2022) also found that additional learning can help with diagnostic screening and monitoring. By implementing after-school programs, summer learning initiatives, and extended class periods, educators can create more supportive environments for students needing extra help. By leveraging data from assessments, teachers can tailor their instruction to meet the diverse needs of their students, ultimately facilitating effective learning loss recovery.

Furthermore, integrating collaborative learning activities during these additional instructional times can foster a sense of community and engagement among students. This collaborative approach enhances individual understanding and encourages peer support, which is crucial for students who may feel isolated or discouraged in their learning journey (Ardiyani et al., 2019). Participants suggested that supporting student learning requires a collaborative approach that extends beyond the classroom. Salciccioli (2021) argued that collaboration is critical to address learning loss. Overall, the findings underscore the necessity of formative assessments and additional learning time as key strategies in effectively recovering from learning loss in elementary mathematics education.

Theme 3 and Theme 4: Teacher Support Received and Needed

Theme 3 indicates that TPS Grade 3–5 mathematics teachers had positive experiences with the support received from school administrators during and after COVID-19, although the support was sometimes ineffective. Theme 4 highlights that teachers needed more support to remediate learning loss for struggling students in elementary mathematics. All participants agreed that support, a critical component of the conceptual framework (see Salciccioli, 2021; The World Bank et al., 2022), is important in assisting teachers with learning recovery strategies for students. The participants noted that support would provide educators with the necessary tools, training, and resources to implement best practices and enhance their instructional effectiveness in supporting struggling students.

These findings support previous research that teachers must receive adequate support from administrators and through professional learning opportunities to help them address students' learning loss. Research shows that teachers require practical support (e.g., professional development or coaching) and preservice training to effectively implement practices for learning loss recovery (Carvalho et al., 2020; Nebraska Department of Education, 2021). Teacher support can also encompass collaboration and communication among educators regarding best practices and the needs of individual students; Salciccioli (2021) argued that students can benefit academically, socially, and psychologically from the shared knowledge of teachers and a robust support system.

It is important to note that while some teachers recognized the need for social and psychological support, the learning loss recovery framework category was mentioned the least in discussions about learning recovery. Students' social and psychological wellness was not a primary focus for most of the 10 participants; only four emphasized that social and psychological wellness should be addressed for struggling students. Some researchers, however, acknowledged that students experience not only academic learning loss following a crisis or traumatic event, such as the COVID-19 pandemic, but they also require socio-emotional recovery (Cochran, 2021; Hanover Research, 2021; The World Bank, 2023). Overall, the findings align with existing research, indicating that a comprehensive support system for teachers is vital for fostering effective student learning recovery.

Limitations of the Study

The study was limited to only 10 TPS Grades 3–5 elementary mathematics teachers, which restricts the generalizability of the findings to a broader population, particularly in middle and high school settings. Additionally, the study's findings depended on the accuracy and honesty of the respondents; any inaccuracies in their responses could affect the validity of the results. Technical issues also posed a challenge, as the loss of audio for two participants due to computer problems compromised the completeness of the data collected, potentially leading to gaps in the research findings. Furthermore, despite efforts to mitigate bias through journaling and reflexivity, there remained a possibility that my previous experiences and assumptions could still influence the interpretation of the data. Data saturation was reached, suggesting that the study may have reached a point where no new insights were gained, potentially limiting the depth of analysis. Focusing on third, fourth, and fifth grades before, during, and after the COVID-19 pandemic means that the findings may not apply to other educational contexts or grade levels. Lastly, using qualitative interviews as the sole data collection method may limit the breadth of perspectives captured in the study.

Recommendations

School administrators and teachers must implement targeted strategies to support struggling students and effectively address learning loss recovery for elementary mathematics. Given that the COVID-19 pandemic has exacerbated educational inequality—particularly among African American, Hispanic American, and Indigenous communities—educators should prioritize equitable access to resources. It is

recommended that school districts provide additional support to African American and Hispanic American students, who may lag behind their peers by 6 to 12 months in mathematics comprehension (Kuhfeld et al., 2022).

Implementing learning loss recovery strategies should ensure teachers have access to modern curriculum resources, technology, and manipulatives throughout the school year. Additionally, district administrators should assist teachers in developing effective strategies centered on modern curriculum resources, technology, and manipulatives to help struggling students recover from learning losses associated with school closures and remote learning. In addition to these strategies, strong support for using established educational standards is essential, as these guidelines provide educators with the necessary knowledge and skills for students in Grades 3–5.

School administrators should offer ongoing professional development opportunities that equip teachers to support struggling students in bridging the learning gap in elementary mathematics. The presence of full-time math coaches and lead math teachers can provide invaluable support, assisting educators in implementing effective practices. Furthermore, educators should be made aware of the four categories of best practices for learning loss recovery: (a) opportunities for additional learning time, (b) assessment, (c) student social and psychological wellness, and (d) support for teachers. Implementing well-structured learning loss recovery strategies is essential to support educators in assisting their struggling students in elementary mathematics. Teachers must continually assess and refine their approaches to effectively address learning losses, ensuring they integrate best practices into their mathematics instruction.

Teachers require relevant support and resources tailored to their subjects. The curriculum for third to fifth-grade mathematics teachers in public schools should be enhanced to better meet the needs of struggling students. This enhancement should include increased district support to implement learning loss recovery strategies.

Mathematics teachers in Grades 3–5 should regularly evaluate and improve their teaching methods to effectively support students who may have experienced learning losses. They need to incorporate effective strategies into their math instruction, and they need access to resources and support specific to their subject area. Furthermore, it is suggested that the public-school curriculum be improved to better support struggling students, with increased district assistance to help implement strategies to recover from learning loss.

Implications

The study's findings emphasize the need for teachers to understand what educational practices can help with learning loss recovery. This finding underscores the necessity for professional development, which is essential for equipping teachers with the skills needed to support struggling students effectively. Additionally, policies are required to help marginalized communities and address disparities in learning loss.

Implications for Educators

Educators must be trained to recognize and respond to learning loss, necessitating comprehensive professional development programs that create supportive learning environments. Additionally, teachers should be equipped with strategies to identify and address classroom inequities, ensuring that all students have equal opportunities to

succeed. Identifying and addressing classroom inequities is essential because although Theme 1 indicated manipulatives, computers, technology, and differentiated instruction were effective in addressing learning loss, teachers also reported that these practices were not always effective for remediating pre-existing educational disparities and learning loss, which were exacerbated by COVID-19, in underachieving students. These students included African American and Hispanic American students.

Implications for School Districts

The study underscores the importance of investing in professional development that targets social, psychological, and equity issues for school districts. This investment may involve workshops, mentorship programs, and collaborative learning communities. Moreover, district administrators should re-evaluate and modify curricula to incorporate strategies that foster equity and enhance student self-efficacy. They must also implement targeted recovery programs in mathematics to address learning loss, allocate resources effectively to support these initiatives, and direct resources toward students most at risk of falling behind.

Implications for Policymakers

Policymakers are crucial in advocating for equitable funding and resources to support marginalized communities and address disparities in learning loss. They should support legislation that mandates ongoing teacher professional development, focusing on equity and student support strategies. Establishing systems for monitoring the effectiveness of recovery strategies and interventions will ensure that they meet the needs of all students, particularly those from disadvantaged demographics. Engaging with

educators in the policymaking process fosters a collaborative approach informed by classroom realities and the challenges educators face.

Conclusions

In this chapter, I explored participants' reflections regarding their experiences with learning loss recovery in mathematics during the COVID-19 pandemic. The findings from the interviews indicated that participants recognized significant learning loss among students and emphasized the necessity of implementing effective recovery mathematics instructional strategies. Participants shared their reflections on overcoming challenges related to learning loss and recognized the importance of equipping elementary mathematics teachers with additional tools and technology resources. These reflections underscore the critical need for a collaborative approach to support students behind in their learning.

In the wake of the COVID-19 pandemic, the insights from educators revealed a profound understanding of the multifaceted challenges faced in elementary mathematics instruction. Participants highlighted essential practices such as differentiated instruction, manipulatives, and technology-assisted learning as pivotal in addressing student learning loss. While educators expressed gratitude for the support from schools and districts, they also recognized the need for more targeted professional development and resources tailored to the specific needs of addressing learning loss. The findings of this study illuminate the crucial role of evidence-based practices and continued investment in teacher training, ensuring that all educators are equipped with the tools and strategies necessary to support their students and address learning loss effectively. Fostering a

community of shared best practices and tailored support will be vital in overcoming the lingering effects of learning loss and enhancing the educational experience for every child.

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Appendix A: Table of Concepts Across Learning Recovery Research

Researcher	Opportunities for Additional Learning Time				Assessment	Student Social and Psychological Wellness	Support for Teachers
	Tutoring	Extended Learning Time	Afterschool Programs	Summer School			
Hanover Research (2020)	one-on-one tutoring programs	Adding time to learning	Merging school curricula into after-school programs, Cost efficient afterschool	Summer learning programs	Individualized learning plans		
Hanover Research (2021)	Peer tutoring Cooperative learning	Enrichment programs		Summer learning programs	Screening, progress monitoring. Formative & summative assessment.	Trauma-informed practices	
Allensworth and Schwartz (2020)	High-dosage tutoring	Extended learning time			Early monitoring systems	Supportive school environments. Teacher-student relationships	
Morton and Hasim (2023)	High impact tutoring	Extending the school day. Double-dose math classes	Academic-focused quality curriculum after-school programs	Interventions during summer or other school breaks			
Salciccioli (2021)	Targeted support in vulnerable academic areas	Extending the school day/year			Identify students' needs for acceleration.		Professional learning to support teachers.
Cochran, 2021		Expanded access to learning opportunities before/during/after school, over summer, and during other school breaks.			Use assessment data purposefully	Include support for the whole child.	
World Bank et al. (2022)					Assess learning levels regularly.	Develop psychosocial health and wellbeing	Support teacher resilience in instruction
Nebraska Department of Education (2021)					Diagnose unfinished teaching & learning. Plan for acceleration		Professional learning for teachers & school leaders.
Carvalho et al. (2020)					Accelerated learning, targeted, and intensive programs		On-the-job & virtual coaching
Peterson (2021)					Understand students' starting points, personalize plan & program, & regular assessments to measure progress.		

Appendix B: Teacher Interview Guide

Thank you for agreeing to speak with me. My name is Regina Bynum-Gray, and I will be talking with you today. The purpose of this basic qualitative study is to explore TPS Grades 3-5 mathematics teachers' instructional practices and the support needed to improve students' pandemic-related learning loss. I will also ask about the support you need for teaching these struggling students. Researchers (Hanover Research, 2020, 2021; Kuhfeld et al., 2020) described learning recovery or learning loss recovery as steps recommended in research that teachers, schools, and districts should take to improve learning loss due to school closures and remote learning. My study focuses on learning loss in mathematics for third through fifth-grade students. Please provide as much detail as possible in response to my questions. Your interview responses will be confidential. With your permission, I will begin recording.

I want to begin by asking about your mathematics teaching background.

Background

1. Tell me about your background as a math teacher.
    a **Follow up:** How many years have you been teaching elementary mathematics?
    b **Follow up**: How many years have you been at this school?

Interview Questions

2. What have been your experiences promoting learning loss recovery in mathematics for struggling students since the COVID-19 pandemic?
3. How is learning loss recovery in mathematics after the COVID-19 pandemic being addressed:
    a. In your school?
    b. In your school district?

    (**Probe** for specific programs, practices, initiatives, and objectives.)

    (**Follow up:** Who from your school has been involved in these efforts?
4. Please tell me about your instructional practices for promoting mathematics learning loss recovery in your classroom.

(**Probe** for specific programs, initiatives, and objectives.)

(**Follow up:** Why do you use these practices?)

5. What role does providing students with additional learning time (e.g., summer school, tutoring, after-school programs, and extended days) play in mathematics learning loss recovery:
    a. In your school?
    b. For the students in your classroom?
6. What role does assessment (e.g., formative/summative) play in mathematics learning loss recovery:
    a. In your school?
    b. In your classroom?

(**Follow up:** Please provide examples of the assessment tools or systems used in your classroom and school.)

Now, I would like to switch to your experiences with support for learning loss recovery.

7. What support did you receive for teaching mathematics after returning to your school after COVID-19?
    a. From the school administration?
    b. From the district administrators?

        (**Probe:** for professional development, coaching, training)
8. What kind of support are you currently receiving in implementing effective learning recovery in mathematics?

a. From the school administration?

b. From the district administrators?

(**Probe:** for professional development, coaching, training)

9. What kind of support do you need to implement effective learning recovery in mathematics? (**Follow up**: Who should provide this support to you (e.g., school/district administrators?)
10. Is there anything else that you would like to add? Do you think there are other issues/points I may have missed?

Possible follow-up prompts that I will keep visible as I interview each participant:

- What did you mean by…?
- Tell me more about…
- You mentioned…
- Tell me more…
- Can you expand more on …?

Thank you for your time!